1.0

1.1

1.25

4.5
50
56

2.8
3.2
3.6
4.0

2.5
2.2
2.0

1.8

1.4

1.6

MICROCOPY RESOLUTION TEST CHART

NATIONAL BUREAU OF STANDARDS 196 A

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CONTENTS

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Cover: The Navy's F/A-18A is one of several Navy and Air Force aircraft on which the HARM AGM-88A will be deployed.

Defense Expenditures and Burden-Sharing in NATO

Hermann O. Pfrengle

In the Defense Systems Management College Multinational Program Management Course, students receive extensive exposure to how other NATO allies do business. As a German guest lecturer in that course, I am frequently asked about Federal Republic of Germany contributions to the common defense effort. Many of these questions relate to the ongoing U.S. and NATO debate about burden-sharing. In this article I will address such issues from a German perspective.

Forward Defense: Germany's Unique Location

The NATO concept of Forward Defense requires the concentration of conventional NATO capabilities at those places where the Warsaw Pact has massed the bulk of its attack forces: in Central Europe and at the Eastern border of the Federal Republic of Germany (GE). Here the GE armed forces bear the chief burden of Forward Defense. The GE is the only NATO country that has made all of its combat-ready armed forces available for NATO defense missions. The German air defense forces are already in peacetime under NATO supreme command.

But GE contributes more than its armed forces to the Alliance's overall mission. Its territory and the burdens placed upon the population in the context of a staging area, among others, are also part of the German contribution to the Alliance. In the case of a military conflict, GE would not only become the main operating area of the Warsaw Pact forces, but simultaneously would become the battlefield on which several Alliance members would defend both German territory and their own countries. This uniquely exposed position differentiates GE from almost all other NATO countries. It goes without saying that the German population's awareness of this seemingly permanent direct threat situation, coupled with equally permanent defense willingness and readiness, constitutes a considerable psychological burden as well.

GE Forces in Central Europe and Maritime Areas

The GE armed forces represent the largest portion of conventional NATO Forward Defense capabilities in Central Europe. In the initial phase of an aggression, the GE Army would have to defend about 65 percent of the entire front between the Baltic Sea and the border between GE and Austria. After arrival of other allied combat units in their respective combat sectors, this share would be reduced to about 55 percent. In addition, the GE Army would not only be required to support the deployment of other allied forces from their respective countries, but would also have to secure the deployment and freedom of maneuver of NATO forces in GE.

Forward Defense on the ground is only possible if the operationally important installations, communications zones, and defense areas can be sufficiently protected from the aggressor's air operations. For this reason the defensive operations of the NATO air forces have the same operative value as the defensive operations of the ground forces near the border. Forward Defense on the ground and in the air must be supplemented by Forward Defense on the seas, and by securing the sea lines of communication for the deployment of reinforcements and supplies. These tasks comprise the major mission of the GE Navy, especially as concerns the northern flank maritime areas. The GE shares of NATO forces in Central Europe and the Northern flank maritime areas are shown in Figure 1.

All units earmarked for Forward Defense are combat-ready and can oppose an aggressor right at the border after a short warning time.

Operational Reserves and Territorial Army

The GE armed forces can rapidly increase their capabilities to wartime strength. A high state of combat-readiness will also be maintained in the '90s, with a peacetime strength of 495,000, by extending the term of military conscription. This will result in a wartime strength of about 1,340,000 trained military personnel. Included in this figure will be about 90,000 men whom GE will place at the disposal of U.S. forces in support of their unit reinforcements in accordance with the Wartime Host Nation Support Agreement.

The BO 105 is a highly maneuverable helicopter. It can load three HOT missiles on each side.

In addition, the GE Territorial Army Brigades, which are partially combat-ready in peacetime, enhance the NATO forces' combat, security and support capabilities. One of the Territorial Army's main missions is protecting and securing the rear areas, thus contributing to the sustainability of Forward Defense.

Armaments and Equipment

Commensurate with the threat, and GE's share within the scope of NATO Forward Defense, the GE armed forces are continuously improving the high standard of their armament and equipment inventories, including new developments utilizing advanced and high-technologies. The following are highlights of those efforts:

Army   An increase in firepower with new gun-type and rocket-type weapons systems; improvement of the anti-tank capability—in which the U.S. Army is presently still carrying an unproportionally high share[1]— through a combination of advanced area saturation systems, anti-tank helicopters and armored combat vehicles; expanding the anti-helicopter capability.

Air   An increase in air strike
Force   capability through munitions of the third generation; augmentation of air defense through deployment of the most advanced air defense systems; development of a high-performance fighter for use by several European NATO allies (underscoring the need for, and efficacy of, greater materiel standardization in NATO).[2]

Navy   The procurement of new frigates, in addition to the recently fielded F-122s, particularly the F-124, a GE variant of the NFR-90 NATO Replacement Frigate, both of which may feature different weapons systems as dictated by their specific combat missions, but have a common ship platform (again emphasizing NATO standardization);[3] new submarines; advanced sea surveillance and mine warfare systems.

German Support and Services for Allied Armed Forces

The GE support and services provided to the allied armed forces stationed on its territory are an important contribution to collective security and burden sharing in the Alliance. Agreements of this nature have been in effect for a long time with other allies. The 1982 Wartime Host Nation Support (WHNS) Agreement concerning GE support for U.S. forces in times of crises or war goes, in terms of quality and scope, far beyond any other agreement of this kind. It reflects the particular GE interest in the rapid deployment of U.S. reinforcements to Europe as early as possible before the start of a military conflict. It also reflects GE awareness that, due to the great distance to the U.S. mainland, the United States is faced with much greater problems in combat readiness support for its Central European units than any

Figure 1. German Share of NATO Forces in Central Europe and the Northern Flank Maritime Areas

Land forces — 50%
Main battle tanks — OVER 60%
Ground-based air defence — 50%
Combat aircraft — 30%
Naval forces — 30%
Naval forces in the Baltic Sea — 70%
Naval air forces in the Baltic Sea — 100%

German share
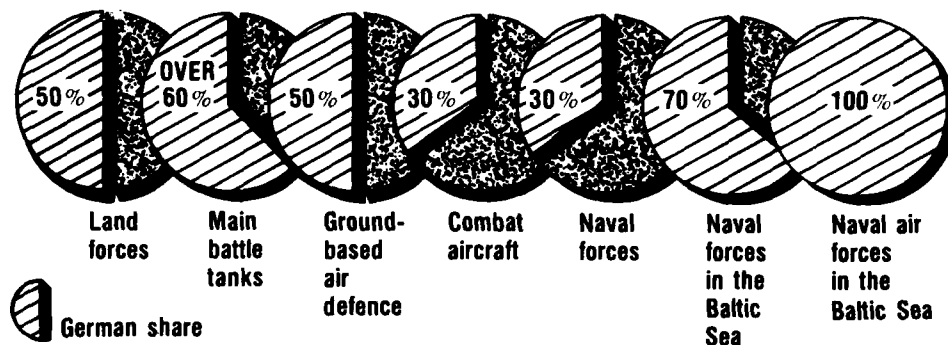
Central Europe and the Northern flank include Belgium, Denmark, Federal Republic of Germany, Luxembourg, the Netherlands, and the North and Baltic Seas

(Source: Federal Minister of Defense, "White Paper, 1985," Bonn)

other NATO ally. The United States has weapons, munitions, and equipment stored in POMSS depots. The construction of these depots is financed through the NATO Infrastructure Program. But it is through the establishment of a suitable support organization by the host nation that the United States is placed in a position where it can, in essence, concentrate on the prime mission of reinforcing its combat troops, and leave support and supply to others. Thus, the time for deployment can be reduced considerably.

The US-GE WHNS Agreement at a Glance

The WHNS provides for the reinforcement by the United States of its armed forces stationed in GE by six additional divisions and supporting combat aircraft squadron within 10 days of the start of a military crisis or conflict.

The GE provides the following military support and services, among others:

—Security of the installations of U.S. air and land forces
—Support of U.S. air forces on joint operating bases, including airfield maintenance
—Transport and transloading services
—Evacuation of casualties
—Decontamination of personnel and materiel
—Maintenance and repair of materiel
—Installation of communication stations
—Facilities for wartime stationing

—Supply with expendable items and rations
—Support with material mobilization augmentation.

For these support tasks, GE is establishing additional staffs, organizations, units and elements, and/or augment existing ones.

The WHNS program costs are borne jointly by the United States and GE. The GE assumes costs for the military personnel and individual equipment of the WHNS units, plus additional costs incurred by the command and control, logistical, and training organizations of the GE armed forces. The United States will procure the materiel not assigned from the material mobilization augmentation task for GE WHNS units, and will pay the civilian personnel, as well as other operating costs. At present, the GE share of investment costs amounts to about DM 670 million, and about DM 70 million annually for operations.

Other, Less Visible, GE Support and Services

The GE is a country—about the size of the State of Oregon, with a population of about 62 million—where armed forces from six member states of the Alliance are stationed. This implies special responsibilities and the acceptance of additional burdens by all levels of government and the people. With about 900,000 military personnel— about 400,000 of whom are allied troops—stationed on GE territory, and including West Berlin, the military

density in GE is 26 times greater than in the United States.

While the installations for operations, command and control, and support of the allied forces are largely provided through the joint NATO Infrastructure Program (see Figure 2), GE, as the host nation, incurs additional costs. These include the provision, free of charge, of real estate at a value of more than DM 40 billion, with an annual utility value of more than DM 2.5 billion to the six allied forces stationed on GE territory. Over 40,000 military installations and training areas and 92,000 housing units for allied servicemen are placed, free of charge, at the disposal of the forces stationed on GE territory. Furthermore, GE defrays the development costs of NATO property, such as those of connecting roads, utilities, etc.

The Forward Defense capability means that the operational readiness of the allied forces must constantly be maintained at a high level. Consequently, more military exercises take place in GE than in any other NATO country. Annually, there are:

—Three or four corps exercises involving about 40,000 men and 10,000 vehicles each
—About 10 division exercises with about 10,000 men each
—About 80 other exercises with more than 2,000 men each
—5,000 exercises lasting up to 4 days, with up to 2,000 men participating in each
—580,000 military flights, 110,000 of

which are low-level (two thirds of GE airspace is low-flying area).

In addition, reinforcement and lines-of-communications exercises on a NATO-wide and transatlantic scale (e.g., "Reforger" and "Autumn Force") mainly take place in the area of GE.

These exercises, while constantly keeping the local population aware of the price for security, also involve many hidden costs of a monetary, psychological and environmental nature which, however, the GE population is willing to bear; nevertheless, these constitute a considerable burden for a small country with a population density of about 250 per square kilometer.[4] Figure 3 shows the spatial distribution of NATO land exercises on GE territory.

The NATO Infrastructure Program

The installations used by all or several Alliance member states are funded jointly, particularly as they relate to operation, command, and support of the allied armed forces. The funding shares are determined by criteria such as economic capacity of the individual ally, the benefits to the user, and economic benefits to the host country. Figure 2 shows the development of the NATO Infrastructure Programs since 1951.

FH-70 155mm Field Howitzer

Roland

Tornado

Tucan

Figure 2. The Development of NATO Infrastructure Programs

Alliance member states are funded jointly, particularly as they relate to operation, command, and support of the allied armed forces.

PAH 2

Airbus A310

PROGRAM YEARS		THOUSAND MILLION DM
II-VII a 1951-56	1	7.55
VII b-XI 1957-60	2	3.48
XII-XV 1961-64	3	2.90
XVI-XX 1965-69	4	2.24
XXI-XXV 1970-74	5	4.55
XXVI-XXX 1975-79	6	4.80
XXXI-XXXV 1980-84	7	9.20
XXXVI-XLI 1985-90	8	22.0

THOUSAND MILLION DM   5   10   15   20   23

Figure 3. Spatial Distribution of NATO Major Unit Land Exercises in GE, 1984.

Major exercises comprise units with more than 2,000 personnel.

HAMBURG

BERLIN

BONN

FRANKFURT

MUNCHEN

☐ 1 MAJOR EXERCISE MAX.

▨ 2-3 MAJOR EXERCISES

▦ MORE THAN 3 MAJOR EXERCISES
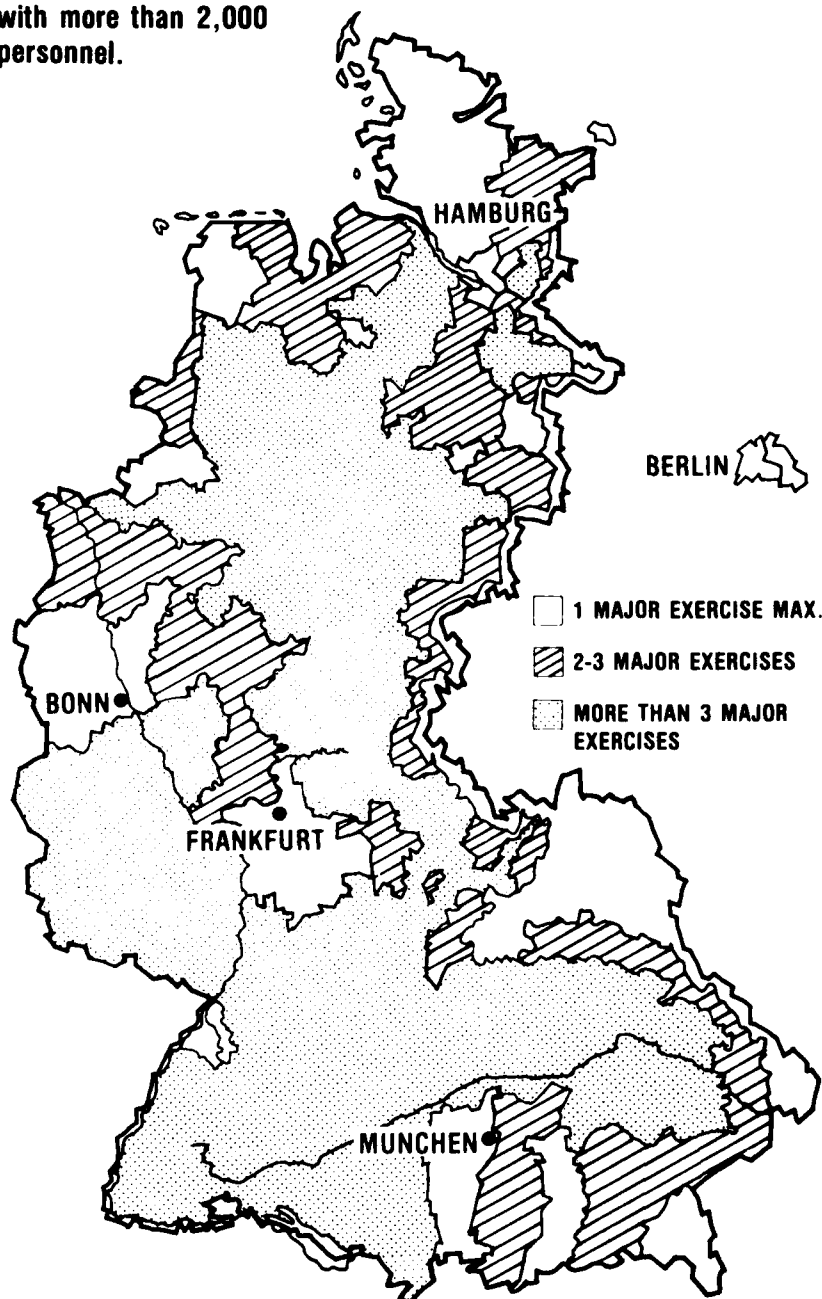
(Source: Federal Minister of Defense, "White Paper, 1985," Bonn)

The large increases since 1980 reflect increasing European threat perception and threat awareness. Altogether about DM 60 billion have been spent or planned for NATO Infrastructure projects.

Air base projects comprise the largest portion of the program. Next in size are funds for communications installations. Third in line are major logistics projects such as those related to fuels, including pipelines and storage. In 1980, a new category of projects have been introduced, dealing with installations for reinforcements from overseas, essentially from the United States. A large portion of the 1985-90 Infrastructure Programs funds are projected for that purpose.

The new 1985-90 Infrastructure Program places joint emphasis on the improvement of the Alliance's conventional defense capabilities. The share for the construction of facilities for the reception and support of reinforcements has been increased to about 40 percent. With this share, U.S. support requirements for (e.g., tactical air reinforcements, including hardened aircraft shelters) can be met by about 75 percent in the next few years. The almost two-and-a-half-fold increase in funds over the previous NATO Infrastructure Program indicates significant augmentation of NATO's conventional combat effectiveness. The gain in defense capability is a multiple of that extra financial cost.

German Defense Aid

Defense aid is also a contribution to the common defense effort. Next to the United States, GE is the only Alliance member which provides financial and material aid to other Alliance countries. Since 1964, Greece and Turkey have been receiving such aid; and, Portugal since 1978. The bulk of this aid consists of new military materiel, free of charge. Furthermore, within the scope of a one-time special arms transfer, Turkey has received 77 Leopard 1 battle tanks, some armored recovery vehicles, antitank missile weapons, and conversion kits for older battle tanks.

The total value of GE defense aid until December 1984 was in excess of DM 4 billion, of which Turkey received about DM 2.92 billion, Greece about .8 billion, and Portugal about DM .3 billion. The GE will continue to provide such defense aid along the criteria of the receiving countries' strategic importance and economic condition.

In the interest of promoting stability in the Third World, GE, in addition to foreign economic and development aid and assistance, provides aid in military training. Since 1961, military personnel from 55 Third World countries have received GE armed forces training and advanced

The Wiesel armored personnel carrier is air portable in both the CH-53 helicopter and the Transall tactical aircraft.
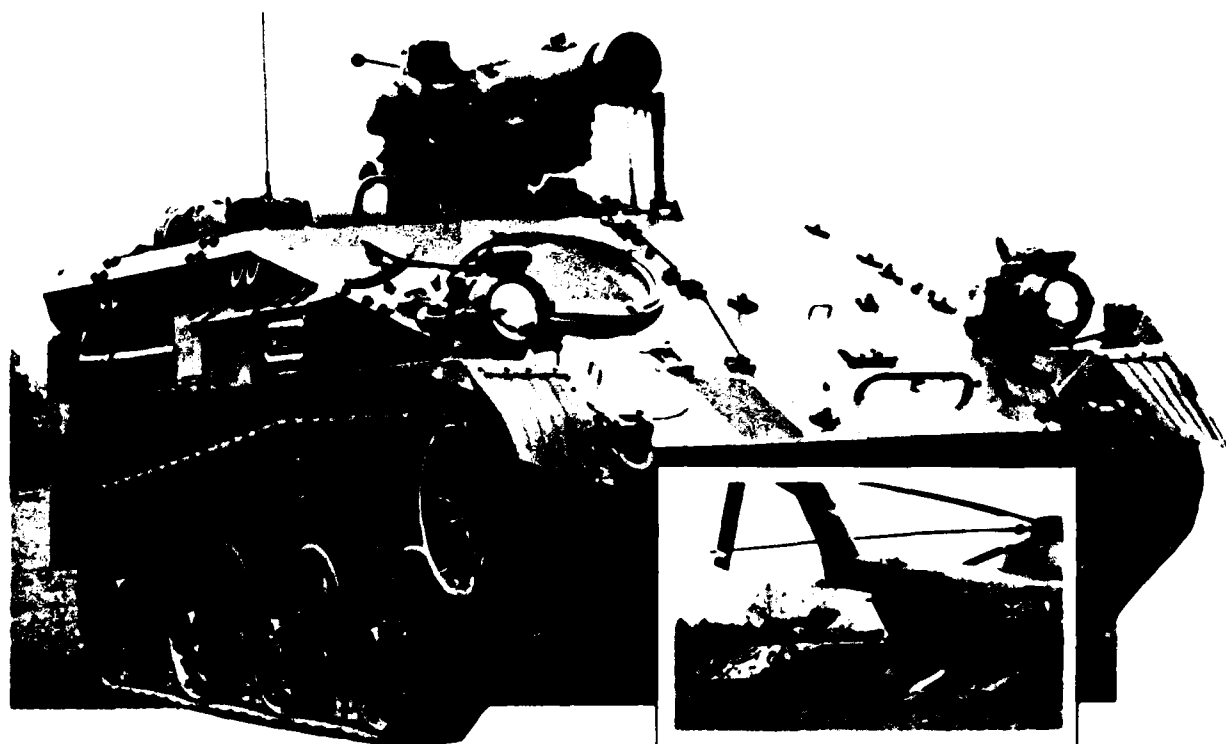
training free of charge. About 40 non-NATO countries have received equipment aid (which, however, excludes weapons and ammunition) totalling close to DM .8 billion.

It is clear that effects of this aid go beyond its military purpose and give rise to developmental processes that help to strengthen administration, infrastructure, technological footholds, and industrialization in the Third World. Thus, many of these foreign officers trained in GE serve later on as multipliers for the transmission of Western values about democracy and society.

The 1985 German Defense Budget

A discussion of GE defense expenditures and burden-sharing in NATO would be incomplete without a closer look at the defense budget per se. The total GE 1985[5] defense budget of DM 49 billion continues the trend of increasing the share of defense expen-ditures in the GE federal budget, after this share had reached its low point at the end of the '70s.

The 1985 GE defense budget (Figure 4) shows marked expenditure increases over the previous year in the number of extended-service volunteers, improved and increased reserve training, new military billeting and facilities, and infrastructure, including the NATO Infrastructure Program.

The expenditures for research and development have increased by 30 percent over the previous year. This increase is dictated primarily by the requirement for the timely initiation of long-term development projects with a view toward materiel and equipment needs in the 1990s, and commensurate with the threat. Increased research and development (R&D) will also provide GE with a better basis for judgment and action in selecting and developing future weapons systems, particularly in view of the increasing armaments cooperation in the Alliance. Furthermore, it is primarily through intensified R&D efforts that German industry will be able to secure its competitiveness.

In contrast to R&D, military procurement shows a drop of about DM 270 million under the previous year. This is due to the fact that major systems such as AWACS, Tornado and Leopard 2 are past their procurement peaks, as well as some improvements in program management efficiency. Without entering details here, GE, with only about 23,000 people handling and managing RDT&E and Procurement for all three services,

■ *Mr. Pfrengle is liaison representative with the Federal Republic of Germany Defense Materiel Liaison Office in the United States and Canada; and, German distinguished guest lecturer in the DSMC Multinational Program Management Course.*

Figure 4. The 1985 GE Defense Budget

TOTAL: 49.0 BN DM

2.5 BN DM (5.1%)
RESEARCH, DEVELOPMENT, TESTING

31.7 BN DM
OPERATING COSTS
(64.6%)

17.3 BN DM
(35.4%)
EXPENDITURE FOR
DEF. INVESTMENTS

12.1 BN DM
(24.7%)
MILITARY
PROCUREMENT

20.3 BN DM
(41.4%)
EXPENDITURE FOR
PERSONNEL

2.1 BN DM
(4.4%)
MILITARY
INSTALLATIONS

7.1 BN DM
(14.5%)
OTHER
OPERATIONS

0.6 BN DM
(1.2%)
OTHER
INVESTMENTS

4.3 BN
DM
(8.7%)

MATERIAL MAINTENANCE
AND OPERATIONS
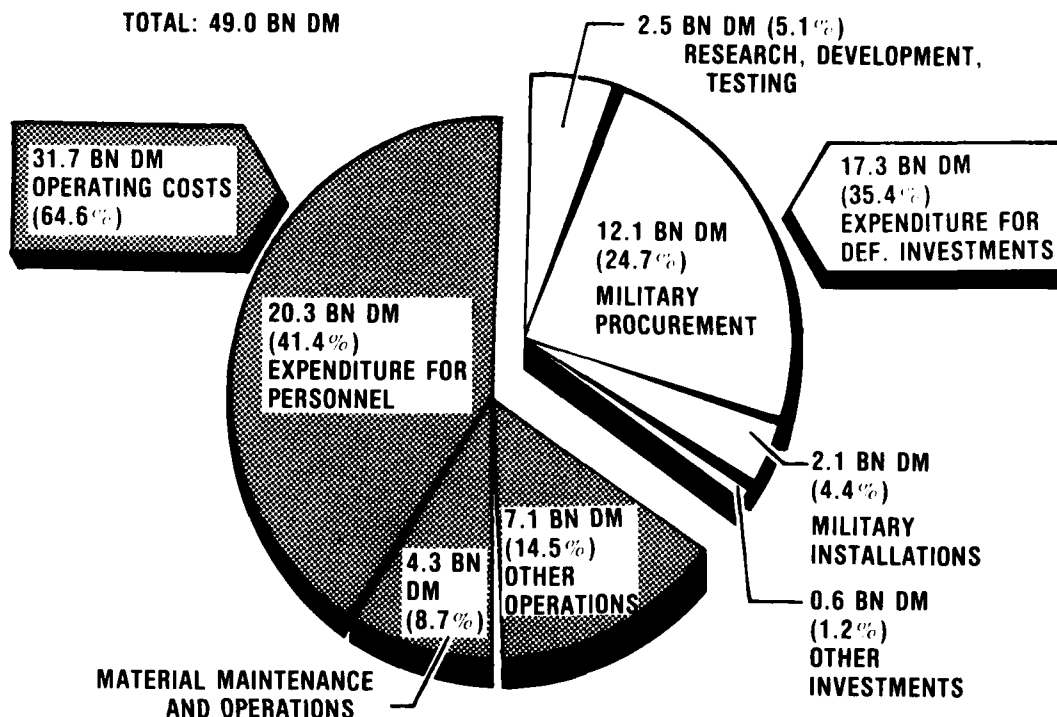
(Source: Federal Minister of Defense, "White Paper, 1985," Bonn)

has a comparatively good overall efficiency record along the lines of the input-output ratio.[6] The above slight reduction in major systems procurement expenditures has helped to release additional funds for other important acquisitions; e.g., DM 325 million for an increase in ammunition stocks, DM 90 million for maritime construction, DM 220 million for wheeled vehicles, DM 140 million for communications equipment. These additional funds are of a particular importance to GE's defense mission, and help to close gaps in the periphery of weapons systems, especially through ammunition and electronic guidance systems procurement.

Berlin—A Unique German Security Contribution

For GE, expenditures to ensure the viability of West Berlin are a component of its outlays for security. In 1985, these amounted to DM 15 billion; for 1986, they are projected to increase to DM 15.3 billion. These financial contributions include, among others, the federal grant-in-aid to the West Berlin budget, and support of communications between the territory of the Federal Republic of Germany and Berlin. These Federal German contributions have steadily increased over the years, and will continue to do so. This is proof of the importance attached by GE to the viability of Berlin as an outpost of the West and a symbol of freedom.

Summary

The share of GDP allocated to defense expenditures of all European NATO countries amounts to a statistical average of 3.8 percent. Including all the unique GE contributions to burden-sharing discussed in this article, and the support for Berlin, the Federal Republic of Germany considerably exceeds the NATO average. The GE, together with the United Kingdom and France, bears 75 percent of the European defense expenditures.

But the sizes of outlays and calculations of the shares of the burden alone do not permit a safe conclusion as to the armed forces' performance per se. It is only by looking at how these defense expenditures are structured, in terms of shares for operations, personnel and investments, that comparative statements on the efficiency with which Alliance members translate money into combat value and capability can be safely made. This is a function of the input-output ratio, and along the lines of this measure the Federal Republic of Germany's record—while still leaving room for improvement—is not bad.■

References

1. The ratio is about 6,000 United States to 7,900 European, including France.

2. Secretary of Defense Caspar Weinberger officially expressed in November 1985 a U.S. interest to participate in this "Eurofighter" project.

3. Partial NATO standardization is also evident in major components of the GE F-122 and the US FFG-7; e.g., common General Electric gas turbine, 76mm Oto Melara gun, U.S. Sea Sparrow missile, and Dutch HSA fire control system.

4. About 625 per square mile.

5. The 1986 GE defense budget had not been published as of this writing.

6. I address program management efficiency aspects in greater detail in my Multinational Program Management Course lectures.

Containing Weapon Program Costs in a Sole-Source Environment

Ernest J. Kish
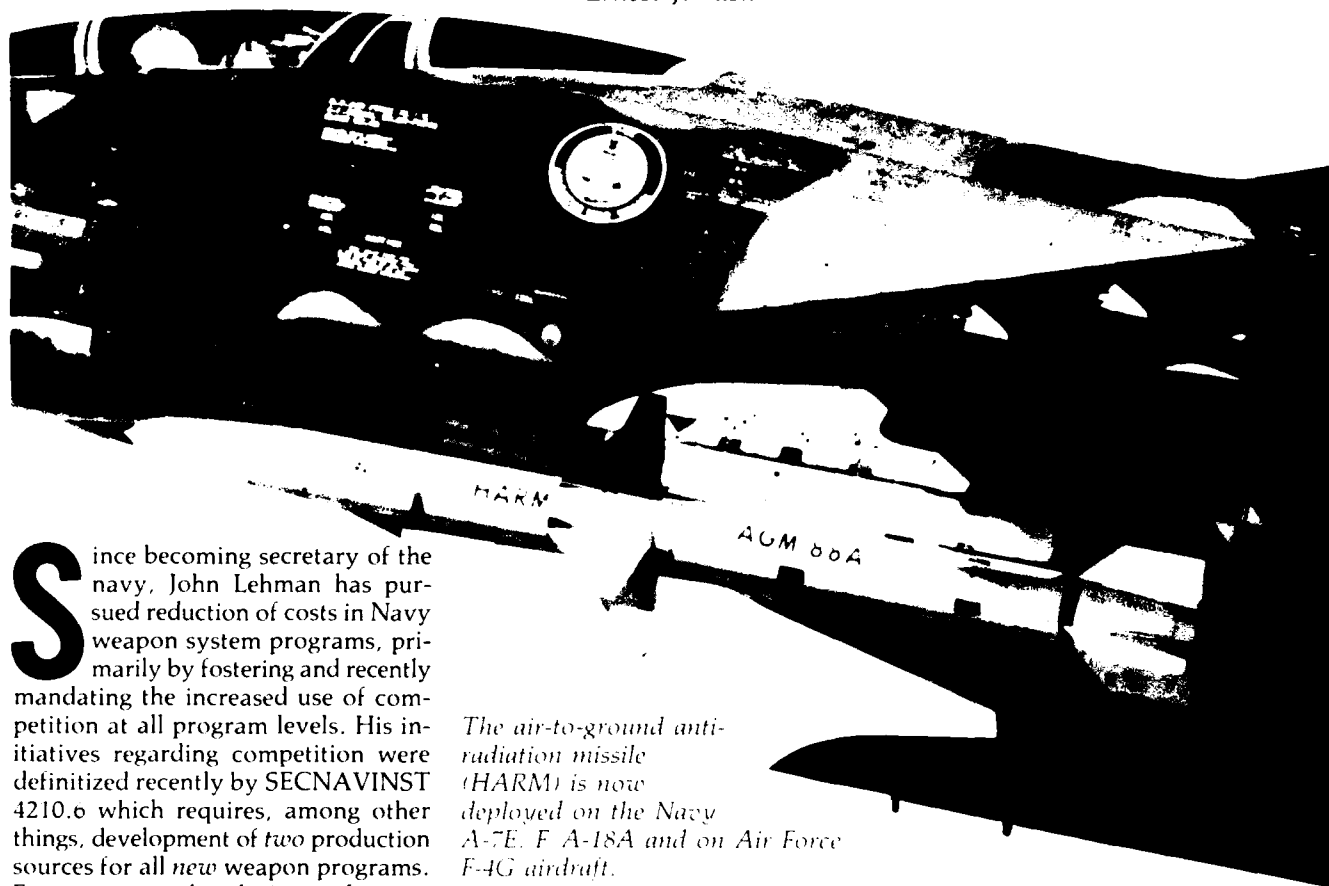
S ince becoming secretary of the navy, John Lehman has pursued reduction of costs in Navy weapon system programs, primarily by fostering and recently mandating the increased use of competition at all program levels. His initiatives regarding competition were definitized recently by SECNAVINST 4210.6 which requires, among other things, development of *two* production sources for all *new* weapon programs. For programs *already in production*, Secretary Lehman has insisted that program managers be innovative and apply all appropriate techniques to reduce costs.

This article addresses a program in the latter category, the high-speed anti-radiation missile (HARM). An initial attempt to develop a second-production source for HARM was unsuccessful, which I will describe later, and the HARM program has a single, prime production source.

However, the program's extensive visibility at secretarial and congressional levels has required the program manager to employ many techniques to reduce costs. This article describes these techniques, which have applicability to many types of programs.

The air-to-ground anti-radiation missile (HARM) is now deployed on the Navy A-7E, F A-18A and on Air Force F-4G aircraft.

The HARM AGM-88A is an air-to-ground missile for use against land- and sea-based radar emitters associated with enemy air defenses. The total HARM weapon system comprises the missile and its associated avionics. The HARM is now deployed on the Navy A-7E, F A-18A and on the Air Force F-4G aircraft. The HARM will be deployed soon on the Navy A-6E and EA-6B, and planning is underway to integrate HARM on the Navy F-14D and the Air Force F-16, F-4E, and F-15E C.

Development of the HARM weapon system began in June 1972 at the Naval Weapons Center, China Lake, Calif., as a joint Navy-Air Force program under executive direction of the Navy. In 1973-74, there was a competition for design, development and fabrication of the missile, avionics, and ground support equipment. As a result, the Naval Air Systems Command awarded a HARM development contract in May 1974 to Texas Instruments, Dallas, Texas. During full-scale development, the government furnished the ordnance (rocket motor, warhead, safe and arm device, contact fuze, and target detector), missile launcher and aircraft modification kits as government-furnished equipment. The program encountered the usual difficulties

associated with the full-scale development phase including a change in requirements, which prompted a program restructuring. The HARM received approval for limited production in 1981 after successful completion of a Navy technical evaluation. Under the fiscal 1981 initial production contract, Texas Instruments assumed total weapon system integration responsibility (with the exception of the government-furnished warhead) in ac-

The HARM is part of the F A-18A arsenal of weapons.

F A-A18

cordance with an all-up-round (AUR) concept. It was responsible for the total HARM AUR missile including components, avionics, and peculiar support equipment; it has since been awarded four follow-on AUR weapon system production contracts.

The HARM received approval for production in 1983.

HARM AGM-88A
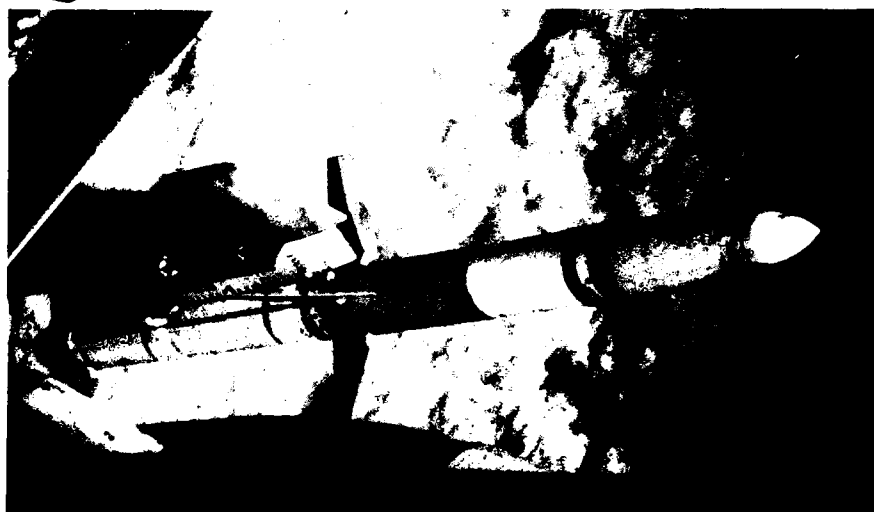
Current Navy policy improves and strengthens the acquisition process through maximum competition. Sole-source procurements will, therefore, be few, but cost-reduction techniques used in the HARM program could be applied. Decision coordinating paper 93B, dated Dec. 1, 1982, contained two procurement alternatives for HARM: (1) develop a second-source and procure HARM competitively in FY 1986 and subsequent years (estimated cost of $80 million), or (2) procure HARM in a sole-source basis from Texas Instruments, the current producer. An additional condition of sole-source procurement was that the Navy would fund qualifications of additional sources at the vendor level (all major subsystems now have at least two sources and 98 percent of the materials are competitively procured).

The Navy supported the dual-source procurement alternative based on historical evidence that reliability, quality and costs are enhanced by competition. The Air Force and the Office of the Secretary Defense supported the sole-source alternative based on inventors fall out at an earlier date. In December 1982 the Navy threatened a cut of the program unless its costs substantially reduced program. As a result, numerous engineering change proposals were negotiated that

reduced program production costs by approximately 3 percent. Texas Instruments agreed to provide firm, not-to-exceed quotations for two subsequent program years as part of the annual negotiations. On April 20, 1983, the secretary of defense granted HARM approval for full production. Also, a Defense System Acquisition Review Council (DSARC) III decision memorandum was issued directing a sole-source program with Texas Instruments as prime contractor. The primary factor in this decision was doubt that the cost, estimated at $80 million, of developing and qualifying a second-source would be recouped through competition. Although the Navy's desire to proceed with competitive sources was not supported, significant cost reductions resulted by

negotiating with Texas Instruments while the threat of competition existed.

It is worth mentioning here that many techniques were used which, in the aggregate, produced major cost reductions: funding of a manufacturing technology program that enabled the automation of labor-intensive manufacturing processes; capital investment in production tooling and test equipment by Texas Instruments to maintain the effect of the steep learning curve and improve product quality, using a no-cost warranty; implementation of value engineering proposals that share production cost sav-

■ *Mr. Kish is the planning officer, HARM Program Office, NAVAIR Headquarters, Washington, D.C.*

ings between Texas Instruments and the Navy, resulting in lower program acquisition and support costs; the positive effect on costs resulting from restructuring the program to a more economical procurement profile, including an earlier buy out of the program; and, accurate government cost estimates that formed the basis for aggressive contract negotiation.

We are continuing to pursue additional cost-reduction techniques. We conducted a study concerning merits of breaking-out some major subsystems and having the government procure them directly rather than through Texas Instruments. As a result, the rocket motor will be broken out beginning in fiscal 1987. Savings during 1987-89 are estimated at 1 percent. Additionally, HARM's submittal to the FY 1987 presidential budget proposes multiyear contracting with a level procurement profile during FY 1987-89. Additional savings are anticipated to be in the range of three percent.

The HARM flyaway unit cost has shown a favorable trend since DSARC III. In the December 1983 Selected Acquisition Report, the HARM flyaway unit cost for the total inventory was given as $272,000 (constant 1983 dollars). The flyaway unit cost in the fiscal 1987 presidential budget for the total inventory is $225,000 (constant 1983 dollars), a 17 percent reduction. This reduction is noteworthy considering that HARM has sustained congressional budget cuts in excess of $230 million during the last four fiscal years; another factor is the 12 percent reduction in the inventory requirement. If these events, which are uncontrollable by the program manager, had not occurred, the HARM flyaway unit cost decrease would have been far in excess of the reported 17 percent.

In conclusion, HARM flyaway unit costs have decreased dramatically since DSARC III despite the sole-source procurement strategy used by the program. With the threat of competition in the initial stages of production (program cancellation and dual sources), costs were stabilized early in the program. The HARM flyaway unit costs have decreased 17 percent by using producibility engineering change proposals, firm-fixed-price contracts with not-to-exceed quotations, competition at the vendor component level, component breakout, multiyear procurement, funding of manufacturing technology programs, capital investment in production tooling by Texas Instruments, value-engineering change proposals, and restructuring the program to a more economical procurement profile including an earlier buy out of the program.

These cost improvements were realized despite budget cuts and procurement profile changes, an environment not unique to HARM. Use of these techniques is equally applicable in both sole-source and dual-source environments. ∎

Rough Terrain Container Crane Approved For Army's Future

Engineers at the Belvoir Research and Development Center have added a rough terrain crane, capable of handling ANSI/ISO containers weighing up to 67,200 pounds, to the list of commercial materials handling equipment that can be bought "off-the-shelf" by the Army as needed.

A performance specification for the crane was developed under the Army's Non-Development Item (NDI) program and approved as the procurement document. The crane has been type classified and will replace the 50,000-pound rough terrain container handler and the 20-ton rough terrain crane in general support ammunition units and will displace the 140-ton crane for certain applications in some transportation units.

The NDI program is designed to reduce Army research and development time and costs by taking advantage of R&D performed by industry. It involves market surveillance and in-

vestigation, followed by development of a technical data package. This procurement package incorporates the performance specifications, and requirements for training manuals, spare parts, accessories, etc. The program has been particularly effective with the highly competitive construction/materials handling equipment industry. Since 1969, the Center has provided tech data packages for procurement of 40 rear area use items.

The new crane specifications call for the capability of the crane to lift a 20-foot container weighing 44,800 pounds at a 27-foot radius and a 35/40-foot container weighing 67,200 pounds at a 22-foot radius. This will allow operators to increase productivity while working in limited spaces in ammunition unit storage areas. Because of the crane design characteristics, it can serve the dual functions of handling break bulk cargo and ANSI/ISO containers. ∎

Value Engineering Change Proposal

The Army Troop Support Command's Belvoir Research, Development and Engineering Center and Litton Guidance and Control, Woodland Hills, Calif., have signed a contract modification resulting in a net unit savings of $12,550 for the position and azimuth determining system (PADS). Estimated future savings for the Army could go as high as $3.6 million.

This savings is the result of a successful value engineering change proposal by Litton, which has a production contract with the Center for PADS, an all-weather, vehicle-mounted inertial surveying system that can provide continuous, three-dimensional position coordinates. The PADS stores its own software programs for operation and maintenance.

The RD&E Belvoir Center's value engineering program encourages contractors to submit cost savings proposals to reduce Army materiel costs. The contractor shares in the savings. ∎

Air Force Acquisition Management: Is There a Better Way?

(A Streamlined Acquisition Management Approach)

Colonel Gene S. Bartlow, USAF

Recent media headlines portending serious economic difficulties in the near-term for individuals and the country as a whole include: "Runaway Spending," "Cost Overruns," and "Cutbacks." The situation has warranted congressional debate, and a degree of presidential support for constitutional amendments to require the government to work within an annually balanced budget coupled with presidential line-item veto authority. This budget situation can be understood by any citizen with a personal checking account. As individuals, we all have to live within our means; however, the federal government has not recently followed that dictum.

The Air Force portion of the "money maze," simply stated, is that the Congress grants the Air Force authority to purchase resources through appropriations. Appropriations authorize Air Force resource managers to incur obligations for general and specific purposes within certain time limits. This translates on down to budgets for acquisition systems divisions, air logistics centers, air divisions/centers, wings, bases, etc. Expenditures range from paper clips to fuel; spare parts to major aircraft and missile weapons systems.

"Money often costs too much," as Ralph Waldo Emerson wrote.

Saving $12 Billion

The December 1983 Grace Commission report on cost control disclosed 2,478 ways to eliminate "waste," thereby saving in 3 years, with recommendations, more than $12 billion. About the same time, a controversy began on spare-parts pricing. One item was a plastic end-cap on the leg of a navigator's chair on the E-3A AWACS aircraft, in 1981; the Defense Logistics Agency bought three of them for the Air Force at $916.55 each.[1]
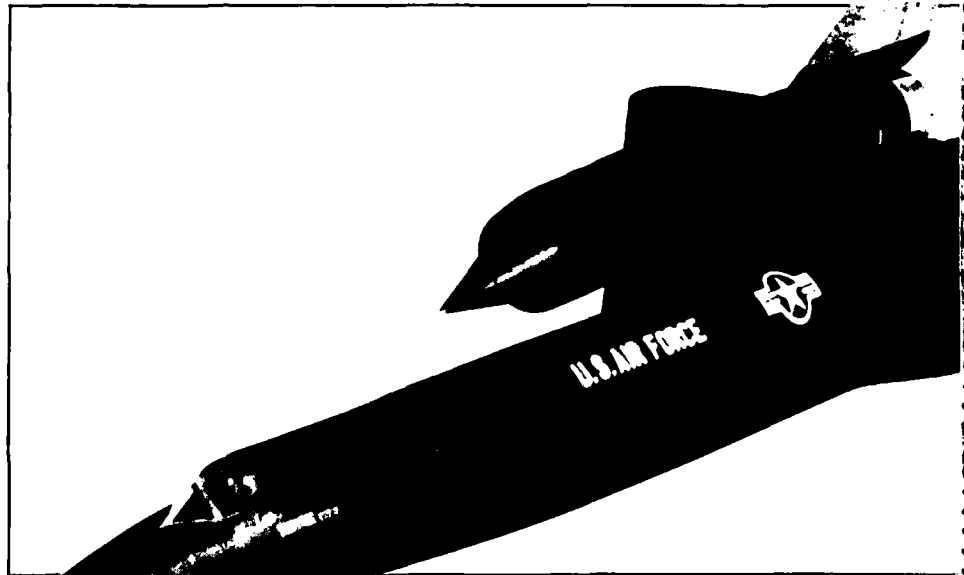
Subsequently, the E-3A contractor estimated the caps would cost $219.18 each and the Air Force accepted that price, which was reduced only after the Air Force zero overprice monitor complained. The price was still outrageous, of course, but there were considerable expenses in producing the tiny order.

The Air Force, *sensitive* to the spare-parts pricing issue, has instituted management systems and new procedures to preclude similar "horror stories." In spite of initiatives to correct the situation, editorials have continued the "drum beat" of expensive weapons systems and spare-parts pricing problems. This criticism, however, is unbalanced and provides an incomplete and often distorted perspective to the U.S. public. Caspar W. Weinberger, secretary of defense, worked hard to turn around the negative perceptions. In a recent letter to the *Washington Post*, he put some of the more notable "horror stories" in the proper context.

While the Defense Department did buy a diode for $110, we also bought 122,429 for four cents each and received a refund for the overpriced diode.

While we bought a claw hammer for $435, we also bought 87,244 hammers of various types for $6 to $8 each the same year and received a refund for the overpriced hammers.

In addition, we actually bought the $9,600 allen wrench—the

SR-71A Blackbird

purchase was stopped as a result of our audit—and we pay less than $10 apiece for toilet seats.[2]

A Paradox

A wise observer comments that in the zeal to clamp down on excessive costs, the paradox is that costs are rising. A partial reason is the paperwork involved—investigations, classification, inspection, and all constraints adding to the cost of doing business. A perfect cost system that scrutinizes the cost of every nut, bolt, and screwdriver is going to add greatly to the cost of those items.[3] Weapons programs must now run a gauntlet of paperwork, which adds far more to cost than is saved by the safeguards. If the trend continues, we could expect that by the year 2000 not a single case of waste, fraud, or abuse in weapon system acquisitions will be reported in the Air Force *and not a single weapon procured.* Total control results in total immobility.

This explains one aspect of a very complicated issue—rules and regulations the Air Force lives by in contracting and acquisition. Rules are extensive, complicated, and exacting. It now takes a great deal of training and time to qualify a system program manager, a contracting officer, a deputy program manager for logistics, an item manager, a budgeting officer, etc. Each rule when constituted was, in most cases, the result of an attempt by senior staff members to prevent in-advertent errors or mismanagement, or to comply with the provisions of public law.

The Environment

The litany goes on and the perception continues, increasing costs, longer acquisition times, poor quality, low reliability, and difficult maintainability. The public, the Congress, the media, and others decry inefficiencies and mismanagement of weapons system acquisition. For example, of the 47 major programs contained in the June 30, 1981, Selected Acquisition Reports, cost had more than doubled since Milestone II reviews of the Defense System Acquisition Review Council (DSARC) for these same programs.[4] Although the current Selected Acquisition Reports would probably not support the same conclusion, the perceptions remain.

In addition to the effects of weapon system costs, a more subtle burden pervades the acquisition process in the form of management and administrative systems. The net result is a massive amount of regulations, procedures, directives, documentation, and review requirements that are imposed on each layer of acquisition management from the Congress to the Office of the Secretary of Defense, through the secretary of the Air Force and program managers and, ultimately, on to industry. "At each level of this chain, a bureaucracy has been created to fulfill and perpetuate these requirements,

*T*he Air Force used streamlined management for the SR-71A Blackbird, the fastest, highest-flying aircraft yet built.

resulting in increased costs at all levels and built-in administrative delays throughout the process."[5]
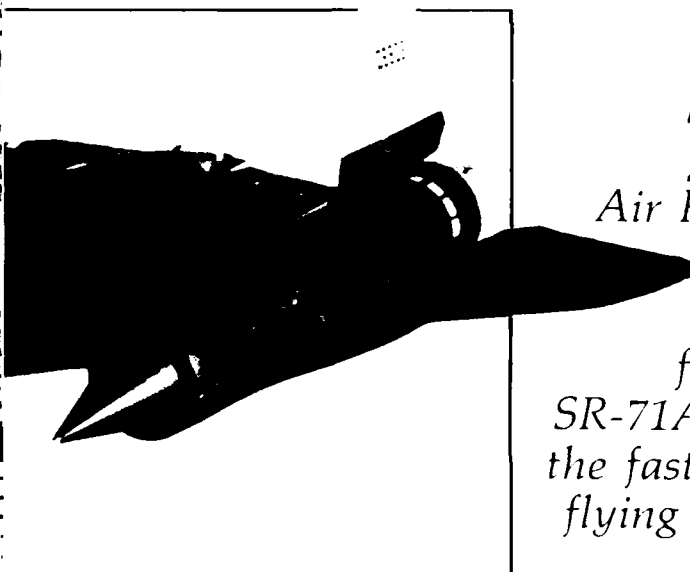
President Reagan's first deputy secretary of defense, Frank Carlucci, in testimony before the Congress stated: "Program Managers and industry initiatives are often stilted by over-regulation." He noted there were then 114 directives related to acquisition, compared to 15 in 1961 and 25 in 1977, and that studies indicated it costs 8 cents out of every contract dollar to satisfy congressionally and DOD imposed management systems and data requirements.[6]

Defense Is No Cottage Industry

The Congress participates in the analysis of defense requirements of the United States to a greater extent than do parliaments of other western democracies. The growth of congressional committees and staffs associated with defense has been escalating in recent years. Ten years ago, four congressional committees wrote legislation on defense; today DOD is shepherded by 24 committees and 40 subcommittees. Defense is no longer a cottage industry on Capitol Hill; the House Armed Services Committee alone fields a professional staff of 54, reflecting the eleven-fold growth in House staff members since 1946.[7]

There has been a significant increase in congressional staffers. For example, in 1970 the House and Senate staffs comprised 11,061 people, and in 1982 they comprised 18,761 (a 59 percent increase in just 12 years), and the growth continues.[8] During 1983, DOD witnesses spent 1,453 hours testifying before 91 committees and subcommittees. The DOD responded to 84,148 written inquiries and 592,150 telephone calls from Capitol Hill; moreover, in the 1970s, the Congress intervened on such vital issues as whether officers' clubs should serve margarine, butter, or both.[9] In 1984, DOD as a whole responded to 7,346 questions for the record subsequent to congressional hearings; there were instances when DOD replies resulted in

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entirely new questions. Then, too, identical or similar questions were submitted to different witnesses throughout DOD, thereby creating duplication and wasted motion.

Current congressional oversight and information requests represent an unprecedented level of micromanagement. The contract or budget data on congressional "what if" drills are not routinely available in the requested format and it is not always in a form used for Air Force management or review. The Air Force should be required to provide only DOD standard information. The statutory workload which has been growing could be reduced. The cost associated with these and other similar activities is hidden, pervasive and often subtle. Many critics, including more than a few on Capitol Hill, believe that micromanagement of the military has cost millions of dollars and led the Congress to scrutinize "trees rather than forests."

From Concept to Combat

The present acquisition administrative process has contributed to an increase in the acquisition time allocated for new weapons systems. Representative Richard H. Ichord (D. Mo.), past chairman of the R&D Subcommittee of the House Armed Services Committee, the 96th Congress, in an article in *Military Science and Technology* stated: "Of all the serious problems besetting the military, none is more profound or far-reaching than the dangerous amount of time it takes the United States to move a new weapon from concept to combat readiness." Representative Ichord observed that "overmanagement is probably the leading secondary cause of defense acquisition delays."[10] Increasing acquisition costs and increasing acquisition times are related; cause for one is usually cause for the other.

Perhaps the most visible difficulty is the impact of funding instability on weapons system acquisition. Often, instability reflects concern over a weapon's performance but too often this finds its origins in the Congress. Erratic swings in research and development money, reflecting congressional direction, is a chief cause of later cost growth and other problems in weapons system acquisition. The Congress has been known to withhold funds on one weapons system until the military

initiated a new direction in another related program; or, pushed the military into buying weapon systems the military saw no need for or considered too expensive for the mission involved.

This viewpoint is disturbing, but not surprising. As the Congress and the public have demanded more say about, and more visibility into, costs of the defense establishment, the services reacted with layer upon layer of management structure to gather the information and gain more control.[11] We have become "so superbly conscious of avoiding errors that we added a heavy overburden to our process."[12]
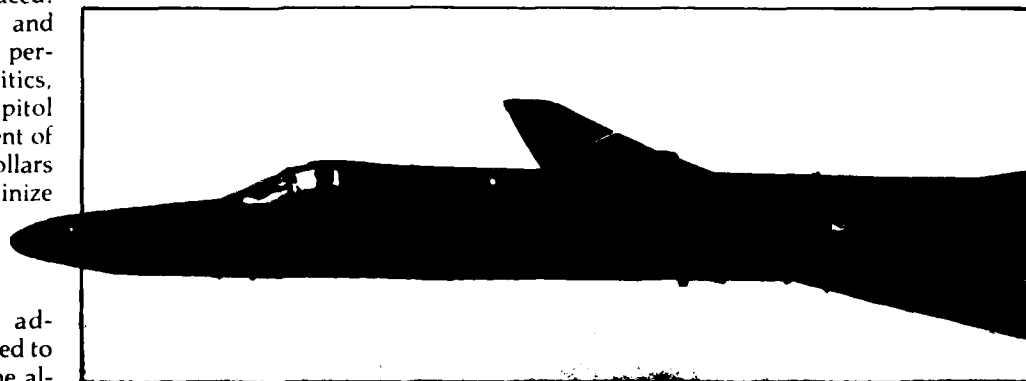
What is the recipe for acquisition success? The simpler the recipe (or solution), the more likely the success.

The Response

The Air Force has instituted many structural, procedural, and management actions specifically designed to improve the cost of weapons systems. One ongoing new initiative, "Acquisition Streamlining," opens the door to diverse opportunities for cost and time reduction. First, acquisition streamlining is any action that can be taken to improve the weapon system process by either reducing costs or eliminating the time required to field a weapon system.

The Air Force approach to acquisition streamlining is outlined in the following objectives:

—Reduce cost and time of weapon system acquisition.
—Establish realistic requirements at program outset.
—Maintain requirements flexibility throughout the life cycle.
—Improve quality.

Colonel James J. Lindenfelser, Air Force streamline advocate, pointed out

it is "important to recognize that streamlining is a philosophy" and that the Air Force intends to "encourage innovation and allow flexibility in the [acquisition] process." The DOD is working on a new draft directive regarding acquisition streamlining. From the Air Force perspective, excessive use of specifications and standards, management control systems, and complicated procedures add to the cost of a weapon system.[13]

The Air Force's new acquisition streamlining initiative provides a broad umbrella under which many opportunities for innovation can be pursued. The new streamlining initiative may require institutional, cultural, and attitudinal adjustments, as well as in the way some people think. It is under the auspices of the Air Force acquisition streamlining initiative that the new proposal outlined herein is offered for consideration.

The Proposal

A central theme of a viable improvement in acquisition management systems is in "tailoring the acquisition process to yield the optimum acquisition strategy."[14] One initiative, if applied, could have the potential for significant improvements Air Force-wide. The proposal may appear radical at first blush, but elements of this proposal have been instituted in selected classified "specialized management" acquisition programs with surprisingly positive results. The proposal is: Apply specialized acquisition management procedures to a broader spectrum of Air Force weapons system acquisition programs.

The Initiative

The Air Force uses specialized management procedures for selected

acquisition programs under Air Force Regulation 800-29, "Application of Specialized Management." Specialized management is a term applied to tailored procedures used by the Air Force to ensure exceptional responsiveness and flexibility in acquisition programs specifically designated by the secretary of the Air Force, the chief of staff of the Air Force, or higher authority.[15]

"Specialized Management" is a system designed to cut through red tape and enable selected people to bypass routine management requirements, some staff, and get on with the task at hand; however, public law remains sacrosanct. As AFR 800-29 states, "The deviations from normal management practices must be consistent with statutory authority and executive orders."[16]

Specialized management allows program managers wide latitude to ignore paperwork and tasks including justification of their respective individual decisions, usually taking time and presenting road blocks, which also are often unwarranted (and ultimately unnecessary), yet mandatory in the acquisition system. An example might be going through the various levels of administrative approval to get a decision on a realignment of management priorities or a weapons system design change, which could take 6 months or more. Even getting obligation authority can take a month if handled through the routine system. The specialized management system allows a program manager to get on with the heart of a job.

Specialized management often requires a greater degree of senior leadership involvement. This allows the system to assign accountability readily. Normally, weapon systems changes are related to changes in missions, threat, or technology. Fewer people within the requirements identification community can further reduce the resulting changes in weapon system requirements. This could result in fewer changes to mission requirements which can equate to lower costs and faster acquisition, the crux of the Air Force streamlined acquisition management initiative.

Perhaps a few pilot conventional weapons programs in the early conceptual or developmental stages could be

*T*he U-2 was an advanced development project with basic production beginning in the late 1950s.

selected for specialized management systems. The DOD and the Congress might exempt these programs from the many acquisition management requirements; these programs could be test cases for DOD and the Congress to evaluate how much management systems cost and time could be saved.

There is now a degree of congressional support for this concept. Senator Sam Nunn (D-Ga.), Senate Armed Services Committee, has expressed interest in the further application of specialized management procedures. In an interview with *Aviation Week and Space Technology*, Senator Nunn said if a few candidate programs could be identified for specialized management, he would give them "one paragraph treatment" in law. That paragraph would say, basically: "We want this to be done with an effective and efficient procurement method with the maximum of competition to the extent feasible and practical, period, end of sentence - 'Now go do it.'"[17]

Senator Nunn in further justifying the idea said: "I really have the view that we've so encumbered the system with rules and regulations and red tape, all with noble purposes, that the cumulative effect of it is just devastating." He added: "The way we're doing business now, if you came down from on high and you said your job was to devise the worst possible combination between the Congress, the Pentagon, and all the elements, I think we've got it."[18]

Specialized management programs, particularly those under the purview of the classified special-access-required procedures, often are required to be processed only through selected congressional members and staff. This procedure is not intended to limit congressional oversight, but to reduce proliferation of the unique highly classified advanced technology information. The corollary effect is to smooth the approval process in the Congress and reduce routine inquiries. There is an obvious lesson here for wider use of this system.

The Air Force, as a further example, previously used similar streamlined specialized management in its dealings with Lockheed-California Company, Advanced Development Projects (ADP), for acquisition of the U-2 and SR-71 aircraft. The Lockheed "Skunk Works" under Clarence "Kelly" Johnson has become synonymous with rapid development times from concept to flight hardware. Specialized management procedures routinely have been used when security was paramount and the need-to-know was to be limited under special-access-required classification procedures. The approach is designed to cut through the high cost and time constraints of the normal procurement and acquisition system, to limit access to the program to people with an absolute need to know, and to protect potentially perishable advanced technology.

Streamlined specialized management is when a small and dedicated team is tasked to provide direction and control of a program, as well as to provide a buffer between the program and the bureaucracy. When matched with a similar structure by the contractor, the savings in management systems and data will pay off richly in time and dollars.[19] Johnson observed that, even in his "Skunk Works," only three percent of the total time actually was spent addressing problems of how to make hardware.[20]

Normally, within specialized management procedures under AFR 800-29, the Air Staff program element monitor, Major Air Command (MAJCOM) staffs, systems program offices (SPOs), and contractor teams are austere as compared to the normal acquisition environment. Management reviews are informal, infrequent, and are usually focused on problems, not status. Some special-access-required classified programs work with less than one-third of the people used in a normal acquisition program. While a skeletal system may not be appropriate for many programs, it sets a standard against which to compare the size of the normal offices of today that are doing essentially the same acquisition job.

Frequently, people in various levels of program management find themselves in the midst of bureaucrats who review, coordinate, and generally interfere with the activities of the programs. Under the guise of "continuity" and "lessons learned," these people invade a contractor's facilities to review design and program plans. The contractor, in turn, must increase the number and size of his middle-management teams. Reviews and data requirements consume time and dollars that should be directed toward designing, testing, and fabricating the new weapons systems.[21] Not only must the contractor increase management personnel to address these issues but the Air Force is faced with a similar problem in responding to congressionally mandated rules.

Specialized management is notable for other beneficial attributes. For example, on-site visits by the SPO are relatively frequent (usually the SPO only) and on-site timely decisions are made verbally and followed-up later in writing. Informal problem-solving working groups are routine. Every engineer is a "system engineer" in thought process and is able to act as a SPO technical spokesperson. Contractor data is held to an absolute minimum (deliverable and non-deliverable); whereas most data are maintained in the contractor-selected format (most useful for design purposes) and accessed through the contractor-maintained data accession listings and computer terminals.

One critical element of a specialized management program is the great re-liance on the integrity of handpicked individuals within these small select program offices—at all levels. When a professional knows there will be minimum oversight, integrity becomes an important factor. The opportunity to take advantage of this system is evident. However, with specially selected key individuals who are recognized as able to handle that kind of pressure and who are entrusted with million-dollar expenditures based solely on the word of a small cadre of individuals, the system can work efficiently. Rewards could be provided through increased responsibilities and promotions for people handling these activities well. Heavy reliance is put on the program managers and on contractor integrity with an open-door policy for *all* information—with full governmental visibility.

Media headlines describe contractors who intentionally overcharge the government. With the spotlight on a specialized management program, there would be an incentive to avoid negative management and accounting practices. Senior management should be prepared for resistance from the military and from contractors when streamlined specialized management is proposed for implementation in a program. Some engineers in the contractor community who have used military specifications for years as a buffer from contractor' management might be uncomfortable when military specifications are tailored or untiered. Some engineers may resist the change from standard methods of operation. However, this initiative would provide the opportunity for contractors to demonstrate their management integrity.

Selection of unclassified programs for a test of the proposal outlined herein would even gain an element of streamlining that the special-access-required classified programs are unable to share; that is, the unclassified program would not require the expense, facilities, time, and manpower needed to place a cloak of secrecy over the project. The unclassified program would not need secure vaults, safes, fences, or communications; or, security clearances, background checks, badges, and special security procedures (other than those required for a normal program).

The bottom line is the ability of all program managers to commit expedi-tiously to procurement and contract decisions—with full authority to act. Thus, individual integrity and trust are vital to the success of specialized management. Conversely, immediate action is required without regard to "personnel management niceties" when an individual is deemed no longer productive or has violated the trust; hiring and firing freedom is essential.

Some generalized benefits of streamlined specialized management include: (1) the ability to field a weapon system faster; (2) significantly less bureaucratic activity without the real loss of senior-level management supervision and oversight; (3) minimum administrative workload with greater emphasis on programmatics; (4) expeditious procurement authorizations; (5) extensive on-site activity and use of informal cross-functional working-group involvement to enhance communications; and (6) heavy reliance on Air Force and contractor personnel integrity, which provides greater incentive to keep the program honest and on track.

The Cautions

Four cautions are important to implement streamlined specialized management procedures beyond the individual integrity imperative discussed above. First, the time-press may increase costs and schedule risks. This requires program managers to maintain a higher than normal management reserve to cover the continuous risk assessment and for planning alternatives. Parallel solutions to problems and high concurrency activities will result in greater risk; but, risk often provides significant cost and schedule benefits and new improvements, provided early decisions were essentially correct.

Second, the time-press increases performance risk including deviations from some standards and an early design freeze could be overturned by the user; but, early and direct user (MAJCOM) involvement in the development effort, and clearly established and defined responsibilities will overcome this potential deficiency. The individual integrity issue again becomes a factor in this arena, but less so when the involved people are the most qualified and are specially selected.

Third, less corporate review raises the potential for integration disconnects with other systems and initiatives; but, with hard work and key

people alert to this potential problem, it can be overcome.

Fourth, if too many programs were authorized to participate in specialized management procedures the ability to field a system expeditiously may be adversely impacted and, potentially, a new bureaucracy would surface to serve this new management component. Specialized management procedures are primarily limited to very unique, classified efforts; expanding this concept into too many other areas could jeopardize the ability to use this technique for special advanced technology programs. This specialized management streamlined system should be restricted to a few select high-priority programs and expanded into other areas only as new procedures warrant. As before, however, risk can generate great benefits; clearly, less risk costs more.

Conclusion

The present acquisition process has become bogged down by review and inertia, while the need for action has become more urgent.

The layman, quite rightly, is baffled by the massive bureaucracy needed to buy weapons systems. It is often true that people internal to the program acquisition process don't fully understand how it works, which is inherently wrong. Common sense cries out for a vastly simplified process.

Proposals outlined herein would require congressional and DOD support, a few test-pilot programs, and further refinement of AFR 800-29, the specialized management directive. If the current acquisition system is not progressing toward inherent improvements, perhaps the current system is part of the problem.

Many will say this departure from the norm is too radical and would never work. Well, it can work. Elements of this proposal work *now* in the special-access-required classified programs with numerous important benefits—not the least of which is reduced time and fewer dollars to bring a system on-line and operational. Some benefits have not and may not ever surface publicly due to the classified nature of the advanced technology involved. Thus, it is impractical to publish in an open forum the true benefits of specialized management because the real success stories are

often highly classified. Suffice it to say, benefits are known to key senior leadership.

Corporately, the government is always looking for ways to cut costs, especially in this current budget-deficit environment. This proposal, workable and costing virtually nothing to implement, may have concomitant risks, but it would have the potential for great savings in time and dollars to the Air Force.

"In 1951, the military ordered 6,300 fighter planes at a cost of $7 billion in 1983 dollars. In 1984, the United States (spent) $11 billion to build only 322 planes—95 percent fewer."[22] Of course, weapons systems are vastly more complex and more advanced technologically with improved mission capabilities. However, granting this greater degree of capability and complexity, trends and future negative prospects for cost and numbers of aircraft produced are alarming. The problem is readily recognizable and something must be done about it now.

In conclusion, the proposal is viable and has great potential. Specialized streamlined acquisition management procedures could be authorized for a few test programs with the potential for important benefits. Given flexibility to use ingenuity, the Air Force and contractors can go far in reducing the trend of spiraling weapon systems costs. Risks are there but experience shows that benefits far outweigh the risks incurred.

Can we do the same or more with less—and sooner? Usually, yes; particularly if we simplify the system and trust hand-picked people to do the job right the first time.■

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April 30—Congress establishes Navy Department, 1798. George Washington inaugurated president of the United States, 1789.

Streamlining Has Begun to Pay Off

Overall, 1985 was a good year for acquisition reform.

The Honorable William H. Taft IV

*These remarks were prepared for de-
livery by the deputy secretary of
defense to the DOD-Industry Acquisi-
tion Streamlining Conference
Arlington, Va.*

At last year's conference, I spoke somewhat hopefully about the benefits we might derive from an aggressive acquisition streamlining effort. This year, I speak with great confidence because your pursuit of streamlining has begun to pay off. In a few minutes, it will be my great pleasure to recognize the most successful acquisition streamlining programs in the department.

First, however, I want to say a few words about our acquisition reform effort in the past year and describe the directions we will pursue this year.

Overall, I believe 1985 was a good year for acquisition reform. We made progress as a defense department in-dustry team to ensure we get full value for our increasingly scarce and impor-tant acquisition dollars.

Measuring Success

In a real sense, we cannot measure our success simply in terms of weapons deployed or dollars saved. The moder-nization of America's armed forces can be measured only in terms of freedoms delivered, peace preserved, and securi-ty maintained. For us in the acquisition community, there is an even more elu-sive measure—confidence in the future.

Still, there are a number of useful in-dicators of our performance. The first is that better, more modern equipment is available today. We have been, and will continue equipping America's fighting forces with systems that main-

Deputy Secretary of Defense William H. Taft IV (left) presents four Department of Defense Streamlining Excellence Awards at the second DOD-Industry Acquisition Streamlining Conference. (second from left) Air Force Colonel Robert G. Goering, deputy for contracting and manufac-turing, Air Force Systems Command Ballistic Missile Office; Army Brigadier General Ronald K. Andreson, program manager, LHX, Light Helicopter family; Marine Colonel Jimmie A. Creech program manager V-22 Tilt Rotor Aircraft Program; and Navy Captain Bruce Marshall, pro-gram manager, T-45 Undergraduate Jet Fight Training System. John A. Mittino, deputy assist-ant secretary of defense (production and support) is in the background.

tain our qualitative edge over the numerically superior forces of the Soviet Union.

Let me give you some examples. Our land forces now have the M-1 tank, which is significantly better than the M-60 it replaced. The tactical Air Force is flying the world's best fighters. Not only is the Navy on track toward the 600-ship goal, but its ships are newer and more capable. Our strategic forces have been improved dramatically with new, high-quality weapons like the B-1 bomber and Trident Submarine. This list could go on. Clearly, the presi-dent's defense modernization program is improving our defense forces, and that means greater security.

While I cannot quantify how much more capable our forces are today than they would be without the manage-ment improvements and acquisition

reform efforts of the past 5 years, I do know that those efforts, including ac-quisition streamlining, have made a difference.

Consider that although the Congress reduced the procurement appropria-tion through 1985 by $70 billion (con-stant 1986 dollars), the defense pro-gram is intact. Our acquisition im-provements have freed badly needed defense dollars for other programs and helped limit the damage done by fund-ing cuts.

Our efforts are paying off. Programs are stable with efficient production rates, major program cost growth has been reduced from about 14 percent annual real growth in 1981, to less than one percent in each of the last 2 years.

A variety of other improvements have forced down the cost of the sys-tems we buy. Of special interest to you

is the payoff from acquisition streamlining. The Navy's T-45 jet trainer program was the first to achieve significant improvements through streamlining. The use of a product improved engine, rather than designing a new engine, is one of the streamlining efficiencies in this program.

Dollar Savings

The Marine Corps' tilt rotor aircraft program gives us an idea of dollar savings possible through streamlining. As a direct result of streamlining by Colonel Creech and his staff, the program will cost $200 million less than previously estimated.

The Air Force Ballistic Missile Office streamlining innovations reduced the time spent in source selection by 40 percent—which means monetary savings too—and eliminated extraneous details, allowing BMO to focus on the real discriminators in contractors' proposals.

The Army's light helicopter program has been successful with streamlining. Brigadier General Andreson's team developed an engine solicitation with concise and simplified performance-oriented specifications that allowed the contractor to guarantee prices and quality.

These streamlining improvements and the many other initiatives underway are paying off in reduced weapon system costs. Each Navy F/A-18, for example, costs $7.8 million less today than we budgeted for it in 1982. The AIM-9 air-to-air missile cost twice as much in 1982 as it does today. And the price of the Army's Blackhawk helicopter has dropped from $5.7 million in 1982 to $4.9 million today.

Acquisition System Is Working

In spite of the so-called procurement "horror stories," which represent a very small part of the department's 52 million contracting actions each year, the acquisition system is clearly working rather well. It is working harder at self improvement than it ever has.

I must warn you that the challenge ahead is even greater than the challenges already met. We are facing a most difficult time in 1986 and beyond. The threat presented by our adversary will demand that even more defense is wrought with every tax dollar appropriated. And just in case that isn't enough, there's the Gramm-Rudman legislation.

I'm not going to analyze the impact of Gramm-Rudman today, but you know what happened in the '70s when we found our programs underfunded and ill-disciplined. Costs soared and the armed forces fell dangerously short of quality manpower and quality weapons.

The president is determined that this not happen again. He remains committed to the 3 percent real growth in defense spending agreed to by the Congress last year. We anticipate presidential budgets will reflect that commitment, within the deficit ceilings imposed by Gramm-Rudman.

I

approach acquisition research reform as an ongoing process of improvement ...we change what needs to be changed.

However, if the Congress acts as it has in the last 2 years, when it drastically cut the defense budget but then took all the savings achieved and applied those funds and more to non-defense programs, we will not escape the arbitrary reductions mandated by Gramm-Rudman. While continued improvement of the acquisition system is necessary in any case, under Gramm-Rudman it is critical. Without a corresponding decrease in threat, you can see that our acquisition improvement programs are even more important as we seek to minimize the damage done to national security by reductions in our budget.

Charting the Course

It is against this backdrop that I would like to chart the directions our acquisition reform will head in the future.

Acquisition improvement and reform, historically, comprise an evolutionary process. It is not a finite search for the all-time best way to acquire weapon systems. That's unrealistic. During the years we have tried many different approaches and found them valuable—for a time. The need for streamlining, for example, results from the mass of specifications and requirements based on "lessons learned" in past acquisitions. The 45,000 MILSPECS, data requirements, management systems, and contract terms and conditions that we've accumulated were not capriciously drawn or applied. What worked in the past doesn't necessarily apply in the *same way* today—consequently the need for streamlining today.

I approach acquisition reform as an ongoing process of improvement. We find potential solutions to identified problems, test those solutions, and change what needs to be changed. We will continue that approach.

We recognize that the improved system of today can be better, can be more efficient, can achieve more for less. Toward that end, we will pursue a number of directions in the coming years.

Better People

One important area that will receive attention is the acquisition workforce. All of our improvements and new management practices will neither solve all of our problems nor ensure against the birth of a new family of problems. One thing, however, always helps—better people. Currently, our acquisition workforce is quite good. But it can, and it must, be even better to meet the challenges ahead.

Toward this end, we are looking for ways to enhance the whole acquisition workforce—from engineers to contracting officers.

We are going to examine changes in pay structure, training and educational programs, methods of rewarding and promoting people with critical acquisition skills, and others.

We are going to look at more dramatic changes, such as whether we would benefit from a DOD acquisition corps of military and civilian professionals. There is potential for an even better and more professional workforce.

Clarifying Roles

Related to the quality of the workforce is the organization of the ac-

is the payoff from acquisition streamlining. The Navy's T-45 jet trainer program was the first to achieve significant improvements through streamlining. The use of a product improved engine, rather than designing a new engine, is one of the streamlining efficiencies in this program.

Dollar Savings

The Marine Corps' tilt rotor aircraft program gives us an idea of dollar savings possible through streamlining. As a direct result of streamlining by Colonel Creech and his staff, the program will cost $200 million less than previously estimated.

The Air Force Ballistic Missile Office streamlining innovations reduced the time spent in source selection by 40 percent—which means monetary savings too—and eliminated extraneous details, allowing BMO to focus on the real discriminators in contractors' proposals.

The Army's light helicopter program has been successful with streamlining. Brigadier General Andreson's team developed an engine solicitation with concise and simplified performance-oriented specifications that allowed the contractor to guarantee prices and quality.

These streamlining improvements and the many other initiatives underway are paying off in reduced weapon system costs. Each Navy F/A-18, for example, costs $7.8 million less today than we budgeted for it in 1982. The AIM-9 air-to-air missile cost twice as much in 1982 as it does today. And the price of the Army's Blackhawk helicopter has dropped from $5.7 million in 1982 to $4.9 million today.

Acquisition System Is Working

In spite of the so-called procurement "horror stories," which represent a very small part of the department's 52 million contracting actions each year, the acquisition system is clearly working rather well. It is working harder at self improvement than it ever has.

I must warn you that the challenge ahead is even greater than the challenges already met. We are facing a most difficult time in 1986 and beyond. The threat presented by our adversary will demand that even more defense is wrought with every tax dollar appropriated. And just in case that isn't enough, there's the Gramm-Rudman legislation.

I'm not going to analyze the impact of Gramm-Rudman today, but you know what happened in the '70s when we found our programs underfunded and ill-disciplined. Costs soared and the armed forces fell dangerously short of quality manpower and quality weapons.

The president is determined that this not happen again. He remains committed to the 3 percent real growth in defense spending agreed to by the Congress last year. We anticipate presidential budgets will reflect that commitment, within the deficit ceilings imposed by Gramm-Rudman.

I approach acquisition research reform as an ongoing process of improvement ...we change what needs to be changed.

However, if the Congress acts as it has in the last 2 years, when it drastically cut the defense budget but then took all the savings achieved and applied those funds and more to non-defense programs, we will not escape the arbitrary reductions mandated by Gramm-Rudman. While continued improvement of the acquisition system is necessary in any case, under Gramm-Rudman it is critical. Without a corresponding decrease in threat, you can see that our acquisition improvement programs are even more important as we seek to minimize the damage done to national security by reductions in our budget.

Charting the Course

It is against this backdrop that I would like to chart the directions our acquisition reform will head in the future.

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quisition process. We have made changes, but further changes may be necessary and we are investigating possibilities. One, of course, is greater centralization of acquisition responsibility; another is an increasingly active role for OSD in management of certain major programs.

In this case, our goal will be to clarify service and DOD roles, enhance the requirements generation process, define lines of authority, assign responsibility, and ensure accountability.

We will investigate promising organizational changes and, where it makes sense, we will initiate evolutionary changes in the system.

The single most important initiative we will pursue in the future will be to extend our concentration on quality. The DOD/industry quality excellence program, which includes acquisition streamlining and other initiatives, expresses our commitment to continuous quality improvement rather than acceptance of a minimum level of quality.

The quality excellence program has improved the quality of the products we acquire and has increased productivity. We must change our thinking and our acquisition approach, from one that unthinkingly often seeks the lowest-priced system of acceptable quality, to one that seeks the highest-quality systems—free from waste and at fair prices.

Quality Is the Real Test

We want to make quality the real test of the acquisition system. We have to find new ways to insert quality into source selection and every decision point in the acquisition process. Our goal is to replace contractor competition based exclusively on price of products meeting minimum acceptable standards, with a process that focuses on the best quality product at an acceptable price. In short, we are moving toward a system that emphasizes competition for excellence along with competition for price. Our feeling is that this approach will prove more cost-effective in the end.

I want to be clear on this. I am not advocating a change in the quality excellence program, but a change in our attitude about quality. The initiatives of the quality excellence program are essential to achieving the level of quality we want, and acquisition streamlining will make an increasingly sizeable contribution in the future.

Acquisition streamlining must become a way of life for program managers in the defense department. I have signed a new defense department directive mandating the use of acquisition streamlining initiatives on all new programs. The directive reflects our goal of exploiting the efficiencies possible with streamlining at every opportunity. For that reason, it defines streamlining as a subject for program

DSARC reviews, and it encourages service reviews to consider streamlining.

Streamlining will be expanded in 1986. Specifically, we are going to examine the usefulness of streamlining initiatives to optimize functional requirements—to provide a means of conducting early cost-requirements tradeoffs and other quality-oriented actions. We will seek to apply from streamlining earlier in the acquisition process with greater interaction of the user, developer, and contractor in determining real requirements.

A Model of Quality

Our emphasis on quality and other improvements in the acquisition system during 1986 will concentrate on meeting the challenge outlined by Dr. Deming, the international consultant credited with a major role in Japan's industrial success. He said: "We can no longer live with commonly accepted levels of mistakes, defects, material not suited to the job, (and) people on the job that do not know what the job is."

That is the direction we are heading: toward an acquisition system that emphasizes quality at all levels, and an acquisition system that is, itself, a model of quality. I urge you to bear in mind that your goal is a better acquisition system, able to produce a higher quality defense. Surely there can be no more important task.■

Corrosion War Hits Composite Materials

The Army Troop Support Command's Belvoir Research, Development and Engineering Center is moving its research in the ongoing war on corrosion into a new area—composite materials. Composite materials like graphite and epoxy resin are being tested as possible replacements for aluminum in some key components of military bridges. According to Dario Emeric, chief of the Chemistry Research Group, Materials, Fuels, and Lubricants Directorate, "they offer the advantage of reducing weight without losing strength. But we need to know how they will perform when they are coupled with other materials in a corrosive environment."

The directorate is performing a number of different tests. According to Emeric, "engineers don't always understand the effects of environment on military equipment." For example, in the Middle East the sand is $2^{1/2}$ percent salt. It's worse than salt air because of the wind. Then you get dew condensation in the evenings so your equipment is constantly exposed to sodium chloride. Equipment is frequently parked for long periods of time, which is harder on it than use because of engine by-products.

"We've done work with the light assault bridge and the heavy assault bridge under the Corrosion Prevention

and Control program, but we had no data on composites and other metals and no one had done any work on the effects of acid rain. We were concerned with its effects on the engineering properties of composites and other metals. Would they lose strength or elasticity under prolonged exposure? What happens when you couple them to high-strength/low-alloy steels and put them in a harsh environment? We want to compare their performance before and after exposure. After all, if an item can't withstand the environment its design doesn't matter."

Results of the Group's study will be published this summer.■

Freedom and Ethics

S. N. McDonnell

Congratulations to the LHX and General Andy Andreson, to the T-45 and Captains Bruce Marshall and Paul Polski, to the V-22 and Colonel Jimmie Creech, and to the SICBM and Colonel Gil Goering. It is indeed an honor for you to have been selected for the new prestigious, acquisition streamlining award. McDonnell Douglas Corporation and its family of aerospace companies and I, personally, enthusiastically support the Productivity, Quality and Streamlining Initiatives of Deputy Secretary of Defense William H. Taft IV.

I commend Mr. Taft, Dr. James R. Wade, Jr., John Mittino, Dr. Richard Stimson, the DOD streamlining focal point; also, Army Advocate Roy Greene, Navy Advocate Gerry Hoffmann, and Air Force Advocate Colonel Jim Lindenfelser for their efforts to implement this initiative. Changing the acquisition culture is tough work.

Ethics, Trust and Freedom

As you know, streamlining is closely related to a number of other vital subjects. I am going to discuss the interdependencies of ethics, trust, and freedom. I believe you will recognize their relationships with acquisition streamlining.

People trying to streamline the defense procurement process are working quite literally in the cause of freedom. And I don't mean that in only the most obvious sense—the sense in which your efforts could improve industry's ability to help our nation's armed forces defend the Free World.

What I have in mind is more complicated than that, and goes far deeper. If you succeed in streamlining defense procurement you will free industry to start doing its best. You will make it more possible than ever for contractors to do their best work; to be as creative and innovative and efficient as they are capable of being; and to escape at least some of the counterproductive requirements that too often shackle us and increase your cost.

Defending the Free World

And if you accomplish that, you will succeed also in freeing the Department of Defense and the armed services. You will free them of the burden of having to monitor every move made by their suppliers. You will free them to spend less time and money and talent on the enforcement of unnecessary requirements that, while accomplishing little good, inhibit creativity and make maximum efficiency impossible. Ultimately, you could free them to concentrate more effectively on the big job I referred to a moment ago: the job of defending the Free World.

You have a big mission, and an important one. I thank and congratulate you for undertaking it. And I wish you a great deal of success, because if you are successful your success will contribute to the well-being, the security, and the economic vigor of the United States of America. Your success, if you are successful, will serve the cause of freedom by helping to make freedom a reality.

I want to examine the connection between freedom—industrial freedom, economic freedom, political freedom—and the equally important subject of ethics. They are related, freedom and ethics, and their relationship is a crucial one. When the link between them—trust—is neglected, it often breaks. And when that link breaks, freedom and ethics are both in danger of perishing.

The American Way of Life

I can best explain what I mean by taking a look backward at the historical development of our nation and its people. Throughout most of American history it was generally agreed that certain basic values were essential to the character of its people. High standards of ethical conduct were considered basic to the American way of life, and the country's standards and values were passed on from each generation to the next by families, by churches and synagogues, and by schools and universities—each reinforcing and undergirding the others. We had a consensus not only on values but on the importance of values, and on the basis of that consensus we knew who we were as a people and where we were going as a nation. Ben Franklin expressed the meaning of that consensus for American society when he said that "only a virtuous people are capable of freedom. The most important thing that we could do is to teach our young to be virtuous."

Today, somehow, it is different. Today, far too many of our homes and schools and religious institutions seem to have fallen down on their traditional roles as promoters and protectors of the nation's heritage. Today, clearly, far too many of our young people are growing up with almost no meaningful exposure to the values that once united Americans of all kinds and all origins—from Canada to Mexico, from the Atlantic Ocean to the Pacific.

This loss of values has grave implications and grave consequences. A people who no longer have a firm grasp on a sound value system—a system that includes such concepts as honor, honesty, loyalty, integrity, self-reliance and adherence to high ethical standards—is a society in which attention is sure to be focused on expediency and on doing the easy thing. In such a society more and more individuals are going to care less about doing what's right than about handling every situation in whatever way will give them the best and biggest payoff in the shortest possible time. In such a society there will be very little trust because too few people will be trustworthy.

When Trust Disappears

And what happens to a society when trust disappears? The evidence of what happens is all around us. When people have to deal with one another (for example when they have to do business with one another or live near one another), the absence of trust creates a huge vacuum that can only be re-

...It is true that the existence of armies does bear a direct relationship to the absence of trust on a global scale.

placed by one of two things: by force, or by rules and regulations. Why, after all, do we have armies? We have armies because nations, to one extent or another and for a great many different kinds of reasons, do not trust one another. I'm not saying there's anything wrong with having an army, or that all nations are equally trustworthy or equally untrustworthy. That's obviously not true. But it is true that the existence of armies does bear a direct relationship to the absence of trust on a global scale.

Similarly, but on a somewhat smaller scale, our cities and states have police forces for exactly the same reason. We have police forces because we know that at least some few members of the population are so completely untrustworthy that we have to protect ourselves from them. There will never be a world in which all people are trustworthy. But if such a world were possible, it would be a world in which there would be very few police and those few would be limited to directing traffic. Certainly they would never have to carry guns. As I've said, such a thing never could come to pass. But, just imagining it is a good way of understanding how important trust—or the absence of trust—is to all of society.

The Strong Red Tape

In the world of business and business-government relations, thank goodness, we do not find it necessary to resort to force or the threat of force to settle our differences and keep things in reasonably good order. That is not to say we have all the trust we need. Rather, we've found it necessary to

make use of the other alternative to trust. We're replacing trust not with firearms but with a thick wrapping of strong red tape—with rules and regulations and laws and procedures and all the other products of modern bureaucracy. Thus, we are making ourselves less free.

Some of our current industrial problems—the very problems you streamliners are trying to solve—are perfect examples of what I mean. One can begin to get an understanding of all this by asking simple questions that are too often overlooked. The questions are: Why does the government, especially the Defense Department, regulate and oversee its suppliers and contractors as rigorously and strenuously and continuously as it does? Why does the government take away so much of industry's freedom even at the price of efficiency, productivity, and technological innovation?

People in the employment of the federal government tend by overwhelming margins to be able and conscientious and patriotic. They want to make a positive contribution through their work. They do not want to make trouble for trouble's sake.

The Public's Money

No, the right answer to a question about the causes of excessive regulation has very little to do with cynicism. But it does have a great deal to do with the subject of ethics. During the long years of American history our government, and the voters to whom that government is ultimately accountable, have learned the hard way, through costly experience, that a few companies will sometimes behave in unethical ways. To protect itself and the interests of the taxpaying public, the government has developed rules to prevent the recurrence of unethical, dishonest conduct. There's nothing intrinsically wrong with that, of course. On the con·rary, such rules are necessary in any society. They are especially necessary where the public's money is involved.

But it was in applying the rules, I think, that the government made what has proved over time to be a very costly mistake. The government decided that its rules—rules devised in response to abuses by some companies or some people—should be applied to all companies doing business with the govern-

ment. As the years passed, these rules have accumulated like falling snow. Today, they threaten the ability of the defense industry to perform efficiently and effectively in the national interest. If the process continues, if it eventually afflicts all industry as it now afflicts defense, it will threaten our survival as a genuinely free economy. Thus, it could threaten the American way of life. You see what I mean when I say that freedom depends upon ethics.

Traditional Values

The problem, as I said, has its roots in ethical failures and the loss of traditional values. It's the erosion of the values, as I've also said, that makes the ethical failures not only increasingly possible but increasingly probable. It's a vicious circle that is sure to lead us downward, away from freedom, unless we can find a way to break out through strong, decisive action.

If the problem is ethics-related and value-related, then necessarily the solution also has to be found in the realm of ethics and values. That's the key to my position on this terrifically important subject. To be frank about it, I don't think there will be a really effective solution until we re-establish two things: trust, and the strong values that are the only possible foundation for enduring trust.

Let's look first at trust. How does one re-establish past levels of trust? To borrow a phrase from a current television commercial, there is really only one way to create trust, and that's the old-fashioned way: "You have to earn it." If people start proving they are worthy of trust, eventually they will be trusted more. I hope that industry will lead, and government will provide more freedom.

Introduce Flexibility

What government can do is gradually introduce flexibility into the system by giving contractors more opportunities to take the initiative in doing things in new and better ways—in streamlining the system. As part of this, the government could differentiate, in applying its restrictions, among companies that have proved themselves to be trustworthy and those that have not. The benefits—not just for industry, but for the DOD and the American people—would be tremen-

dous. Unshackling industry, and refraining from punishing the innocent along with the guilty when something goes wrong, could produce a flood of benefits for the nation. It could start us back on the road not only to rising productivity but to more freedom.

Industry for its part must strive to assure that it, and its people, are keenly sensitive to the ethical dimensions of doing business and are, therefore, worthy of trust. This is important under all circumstances, but it will become especially important if, as I am proposing, industry is given more freedom to innovate. I think its importance is already being recognized. More and more corporations are taking steps to train their employees in ethical decision-making and emphasize the importance of taking the high road whenever ethical questions arise. My own company is just one of a steadily growing number of major corporations that have established ethical training programs in recent years. I can tell you from direct experience that it works and it really can have an impact on the basic culture of a business organization.

A Tall Order

What about the biggest job of re-establishing not only trust in business but the great system of traditional values that made this country great? Obviously, that's the tallest kind of order. It's beyond my power, and it's beyond the power of this streamlining effort. The truth is, it's beyond the power of any individual or any single group or institution in America.

But—and this is the important point, the basis for hope—it's not beyond all of us working together. None of us alone can return America to the values that once defined it, but each of us has a real and potentially tremendous opportunity to help make it happen. If we all make use of our own opportunities, it will happen. That's a wonderful reason for being optimistic when you stop to think about it.

We can make our contributions through the ways we do our jobs; by making it clear that we have high ethical expectations of the organiza-

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*T*o *understand and maintain the American way of life, to honor it by his own exemplary conduct, and to pass it intact to succeeding generations is the responsibility of every true American.*

George Washington

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tions we represent and the people with whom we deal; through our support of the right kinds of organizations and institutions (in my case that's the Boy Scouts of America, for my money one of the last and best strongholds of our national heritage). The possibilities are almost infinite, and the potential for change really is infinite if only we make use of it.

Working Together

Let me remind you that one of our national mottos is *E Pluribus Unum*, which means "one out of many." We must do all we can to regain that consensus of values that united all Americans into one and gave us the knowledge of who we are as a people and where we are going as a nation. To accomplish this we all need to do our part. As the saying goes, "If not I, who?" "If not now, when?"

You represent a great deal of good will, of intelligence and experience, and of influence with people and institutions throughout America. I'd like to appeal to each of you to do all you can not only with streamlining but to help restore the traditional values of our American heritage to their rightful place in our national life.

George Washington said: "To understand and maintain the American way of life, to honor it by his own exemplary conduct, and to pass it intact to succeeding generations is the responsibility of every true American."

Let each of us decide how we may best fulfill that responsibility to these great United States of America. ■

DSMC and Services "On the Road" with Competition

The Defense Systems Management College (DSMC) and military services' competition advocates are developing a specialized, 2-day Production Competition Course based on the handbook, *Establishing Competitive Production Sources*, published by DSMC in August 1984. The course is designed to provide program managers and their management staffs with the skills and analytical tools needed to establish production competition. The course will cover evaluating programs with respect to competition: whether or not competition should be introduced,

when, how, and to what extent. It will include demonstration and "hands on" practice with a computerized competition evaluation model for comparing the benefits with the costs of implementing production competition. The course will culminate in a case study in which students will use the model and evaluation techniques in selecting and developing a production competition strategy.

The Production Competition Course will be offered in buying command headquarters in June, and in Army ma-

jor subordinate commands, Navy Systems Command, and Air Force systems and logistics command field organizations in July, August and September. A detailed schedule of offerings will be published in the May-June issue of *Program Manager*. For more information on the course, call Sandy Rittenhouse, Professor of Systems Acquisition Management, AUTOVON 354-4795/5783 or Commercial (703) 664-4795. ■

Streamlining Initiatives

They've Been Around for a Long Time

The Honorable Donald A. Hicks

The issues you've been addressing are obviously critical to me as the under secretary of defense for research and engineering (USDRE). It's in the early stages of our programs that we lay the foundation that determines whether we carry out programs in the efficient, streamlined fashion envisioned in the initiative of Deputy Secretary of Defense William H. Taft IV. I would observe, however, and I'm sure you'd agree, that there really isn't much new in the concepts of the streamlining initiative. These are good ideas, many of which have been around for a long time; if that's the case, I think it's reasonable for you (particularly you in industry) to ask why there's any reason to think the Department of Defense is really serious this time.

I think I have a good answer to that question. This morning, I talked with a group of senior Army leaders about North Atlantic Treaty Organization (NATO) armaments cooperation. Like streamlining, cooperation with our allies in the development and production of weapon systems has been recognized for a long time as a good idea—a good idea that has not produced enough in the way of concrete accomplishments. You also have every reason to ask about seriousness. What I said to those Army leaders, I will also say to you: We are serious because of economic and military necessity. If we ever had it in NATO, we simply no longer have either the economic or military luxury of fielding duplicative, often incompatible weapon systems. Domestically, in an era of huge budget deficits, multiple competing demands for scarce public resources, and an implacable threat, we simply cannot afford (either economically or militarily) not to design and produce our weapons in the most efficient, streamlined manner possible.

I wonder if Voltaire was anticipating our troubles when he wrote: "The best is the enemy of the good."

Some "Good Ideas"

With that thought as a foundation, I want to elaborate on some "good ideas"—again, none of them are revolutionary—that would help us with the front-end of the acquisition. Then, I want to talk about what you in the audience, particularly you in industry, can do to help see that we're more successful getting "good ideas" implemented than we sometimes have been in the past.

This past summer [1985], the Defense Science Board (DSB) sponsored a panel on practical, functional performance requirements. A number of ideas that came out of this study are relevant to our effort to improve the front-end of the acquisition process. I'd like to review some of them with you.

First, after it reviewed experience in a number of DOD and technologically complex commercial programs, the DSB pointed to a need for more flexibility and honesty early in the requirements definition process. The panel pointed out that in DOD, over-promising on results and underestimating risks are the ways for advocates to get a foot in the door for a new program. In the private sector, this lack of realism can be a recipe for disaster. How can we make our environment more [...]

"Workarounds"

Second, the panel pointed to the importance of translating requirements into high-risk technical areas. The panel noted the importance of assessing that not all facets of the program are of high risk. For those that are, they suggested providing workarounds—perhaps in case work in some of the high-risk areas simply doesn't pan out or won't without excessive cost. I wonder if Voltaire could have been anticipating us and our troubles when he wrote: "The best is the enemy of the good."

Further, keeping with the spirit of Voltaire, the panel recommended more use of preplanned product improvement (P³I). If we could make more use of marginal upgrades of existing

systems, we could reduce both our costs and fielding times. And, nothing about this approach precludes the incremental incorporation of significant technical advances.

As I mentioned earlier, the DSB panel did some case studies of commercial experience with complicated "high tech" projects. One thing they found that often distinguishes commercial practice from our way of doing business in defense was the tendency to hold schedule constant, and to adjust other variables (such as performance) to accomplish this objective. Similarly, in their defense programs, the Soviet Union seems to follow more nearly our commercial practice. This maintaining of the integrity of schedule is, of course, very important to commercial firms to whom timing of market entry of new products is critical. For the Soviet Union, it may mean that some of the latest leaps in technology have to wait for the next generation of a particular weapon system, but it does get systems fielded in a timely manner. Also, and here's the important conclusion reached by the DSB panel, holding to schedule tends to control cost. Therefore, the panel recommended that the DOD define acquisition strategies that place more emphasis on holding to a fixed schedule.

The Chain of Command

The final point I want to make with respect to the summer study on practical, functional, performance requirements has to do with the authority and responsibility we give our acquisition managers. Here again the study drew on comparisons to commercial practices. And, to no one's surprise, the case studies suggested that the manager of a new-product development in private industry has a much shorter chain of command to report through than is typically the case in DOD. He also is generally insulated from the massive review and oversight requirements that are common in DOD. Not surprisingly, the DSB panel recommended that we try to do our business more along the lines of the commercial model.

Conclusions and recommendations of the DSB summer study on practical, functional, performance requirements are hardly revolutionary, and certainly fit neatly with the thrust of our streamlining initiative.

However, we need to be concerned about results. Just observing that development of requirements should be an iterative process in which alternative technical solutions are traded-off against affordability, performance, and risk criteria doesn't really get us anywhere. Similarly, we've all believed for a long time that clearer lines of accountability and authority and less interference by the "ilities" should help us achieve more successful outcomes in our acquisition programs. The conclusions about the importance of sticking to a schedule as a way to control costs and ensure timely delivery are hardly new, particularly to those who (as the DSB panel did) have studied the experiences of the private sector.

There is nothing really new...so why is it always difficult, in the real world, to put good ideas into practice?

Making Things Work

What we needed is some method to increase the odds that the results of the DSB effort are used in a way that really works to help us improve the front-end of our acquisition process. To try to figure out what we could do to keep this study effort from being just another report gathering dust on a shelf, I talked to Under Secretary of the Army James R. Ambrose. He agreed to designate a program and, in conjunction with some DSB panel members, to monitor its progress in implementing the practical, functional, performance requirements recommendations. That program is the LHX; we will be watching its progress and trying to ensure that the "good ideas," for which we never seem to lack, get translated into positive actions.

As I've said, there is hardly anything really new about the conclusions and recommendations I've just outlined. So why are we still in a start-up mode, particularly given the current stark realities of constrained resources to be applied to a task that remains undiminished in magnitude? Why is it always so difficult, in the real world, to put good ideas into practice?

"Congressional/Industrial Complex"

For part of the answer, I believe we need to look outside the Department of Defense to something I might describe as the "congressional/industrial complex."

Even if we in DOD were perfect, which of course I'm quick to concede we're not, how much room for real improvement is there, given the external forces at work? I spoke earlier about the need for more realism in our estimates and promises. How candid and realistic are your firms when they go to lobby their elected representatives on behalf of their existing and proposed programs? And how often does all this kind of activity culminate in a process where political considerations rather than objective analysis drive the decision-making process?

This is not to say I don't understand the position of industry. As a veteran of long association with it, I do. Unfortunately, one of the inevitable consequences of the political process in a democracy is that things come out wrong sometimes. I believe we are moving into an era where we simply must make fewer mistakes.

Our streamlining initiative and the Defense Science Board study concern trading-off requirements as a way to emphasize affordability early on. We want to emphasize defining what we want and avoiding specifying in detail how we want it done.

Consider the Fruitcake Spec

Those of you who read newspapers throughout the holiday season know that 1985's best publicized case of the DOD being overboard on "how to" was the 14-page Mil Standard for fruitcake, which was read into the *Congressional Record* by Senator Sam Nunn. You may have read that the latest revision of the specification raises our standards for the tolerances of candied cherries.

However, there are two things about this story that I'm sure you didn't read in your newspapers. First, in his floor speech, Senator Nunn commended DOD and Deputy Secretary Taft on the acquisition streamlining initiative. Second, you didn't read that DOD is required by law to conduct a competition and to select the lowest priced bidder as its source of fruitcake. While I don't defend the 14-page spec as the right way to buy a fruitcake I must observe that, given the competitive requirements, detailed "how tos" are not an entirely irrational approach in trying to ensure we buy a quality product.

But we're not talking about fruitcake, so why do I bring up this anecdote at all? The answer is that I'm concerned that an inevitable consequence of additional requirements for competition—and perhaps even the existing legislation—may move us in the fruitcake direction. If that happens, we will not be able to carry through with the kinds of improvements contemplated in the streamlining initiative or by the Defense Science Board.

We need to avoid doing anything dumb in the area of competition. To see that we do, we're going to need help from the "congressional/industrial complex."

Must Have Congressional Support

Another area I've talked about that is vitally affected by congressional action is weapon system program schedule. We in the DOD are not blameless as far as schedule perturbations are concerned, but if schedule is ever going to provide the kind of discipline

We must avoid the temptation to try to solve our problems with simplistic solutions, many of which only unnecessarily increase our complexities.

contemplated by the Defense Science Board, we will have to have the support of the Congress. Inevitably, that will force a priority-setting process and hard choices that have historically been distasteful to the "congressional/industrial complex."

I want to share some thoughts with you about our potential to reap the benefits of more nearly emulating the commercial model for the management of complicated development programs. To make the streamlining initiative a success, we will need to have the clear lines of authority and responsibility that more typically characterize the private sector. Here again, however, we cannot succeed without the Congress. I am concerned that the legislation of the last few years (much

of it enacted in response to well-known "horror stories") may be moving us in exactly the opposite direction. Inevitable consequences of increased legislative intrusion into the management of weapon system acquisition are more review, more oversight, more blurring of the lines of authority and responsibility, and more tendency toward risk-averse behavior on the parts of those involved in the acquisition process.

What we need is exactly the opposite of all that. It is my belief that the deliberations of the Packard Commission, and the congressional look at its own role in our problems (which is an outgrowth of its studies about DOD reorganization) may cause a moratorium on additional legislation. I would welcome that development. We all could use some time to stop and take stock.

People in industry could use this time to make sure they have adequately communicated their views to the Packard Commission. We in the DOD and the Congress need to listen too—to you and to each other.

We Cannot Afford to Fail

Sometimes I think we all lose sight of the fact that weapon system acquisition is a complex process because weapon systems are complicated products. We must avoid the temptation to try to solve our problems with simplistic solutions, many of which only unnecessarily increase our complexities.

We cannot afford to fail. The stakes are simply too high.■

How to "Take a Briber"

A former government procurement analyst learned the hard way that accepting bribes can lead to real trouble.

The analyst, a GS-12 with 12 years of federal service, pleaded guilty to accepting approximately $1,000 in cash from the president of a Connecticut firm for disclosing confidential pricing information.

A U.S. District Court judge placed him on five years probation and fined

him $2,000. The analyst resigned from government service the day after he was indicted.

Bribery is just one of the subjects covered in a new Department of Defense Inspector General publication, "Indicators of Fraud in DOD procurement." Some 50,000 copies have been distributed since its late-summer publication.

Michael Eberhardt, assistant inspector general for criminal investigations,

policy and oversight, says the 56-page publication is an analysis of the primary indicators of various types of fraud that have been seen in the Department of Defense.

"The book," he says, "is intended to sensitize Department of Defense procurement personnel to a variety of criminal, contractual, civil, and administrative abuses." The book also identifies a list of remedies that can be used to rectify these problems.

DOD Acquisition: What the Future Holds

Quality is on the Top of Our Agenda

The Honorable James P. Wade, Jr.

From the outset of the Reagan administration, we have dedicated our best efforts to revitalizing the nation's military strength to meet the expanding threat of Soviet aggression. In view of the continued growth of Soviet defense capabilities, the revitalization process cannot be limited to short-term considerations. A long-term commitment is needed. One of the most important new long-term initiatives is *streamlining*. I will address streamlining and other initiatives.

Streamlining of Department of Defense (DOD) requirements is integral to the challenges I see ahead to improve the DOD acquisition process.

Sound Business Judgment

The need for the streamlining initiative goes back to the overall requirement for the department to use sound business judgment in its acquisition procedures. This is imperative, particularly in light of *Gramm-Rudman*, which will severely constrain our defense buildup, and most likely force reshaping of many current programs.

The objective of the acquisition process is to field affordable systems that are capable, effective, reliable, and supportable—systems that allow us to be as ready as possible to respond to challenges that could confront us. The timing and climate are right for streamlining to become an integral part of our program management process. We need industry knowledge of the cost drivers in the acquisition process. Just as important, we need the skills and dedication of our best people to

Mr. Wade

devise creative and cost-effective methods for achieving our system acquisition requirements.

Cost-Effective Application

The streamlining initiative recognizes that cost-effective application, and tailoring of specifications are inherently part of the design and development process, rather than an action-limited preparation of the solicitation. It recognizes that the issue of defining the most cost-effective approaches extends far beyond the 45,000 or so documents in the index of specifications, and standards; it includes performance requirements, data, management systems, and all other facets of our contract requirement. Streamlining is based on the premise that we need to reduce the adversarial relationship between industry and government, and be willing to increase communication in order that we jointly establish the most cost-effective approaches.

For streamlining to be meaningfully accomplished, there must be a management climate to encourage greater ingenuity and cost-consciousness in the hundreds of decisions on detailed requirements associated with acquisition programs. No specification should be treated as inviolable. We must create a management climate whereby government and industry personnel are encouraged to treat specifications and standards as living documents, to be appropriately tailored for effective applications in our system acquisitions.

Feedback and Accountability

It will be necessary for the Department of Defense to ensure there is appropriate program guidance and a system of feedback and accountability to accomplish effective streamlining. Progress in implementing the streamlining initiative will be reviewed in the defense systems acquisition reviews for all new systems, and for those systems previously designated to implement streamlining.

We must recognize the accomplishments of our acquisition personnel in streamlining programs. I commend people meaningfully pursuing the acquisition streamlining approach. Streamlining must be pursued in conjunction with other initiatives.

The Challenges Ahead

As you have concluded from recent congressional and governmental initiatives and recent newspaper reports, the area of acquisition and logistics is ripe for reform. To be effective, the Department of Defense and defense industries need the trust and confidence of the American public. Unfortunately, we have placed that trust at risk. The litany of overpricing, examples of poor quality, media and congressional suspicion of the defense-industry rela-

tionship, and charges of malfeasance, have damaged our credibility.

Credibility

The fact is, our credibility with the American people is in jeopardy. A recent Harris Poll revealed how much of a challenge we face. Eighty-two percent of those surveyed agreed that, and I quote, "The companies which have the big defense contracts put in false expenses and rip off the American taxpayers." Eighty-seven percent agreed that "There is too much waste in defense spending."

These numbers should be of concern to everyone because, there is substance to some criticism we received.

Too many contractors have surfaced with pricing problems, questionable or patently improper overhead claims, or other problems. We cannot dismiss every congressional effort to reform the defense acquisition system as political grandstanding and headline grabbing. Nor can we dismiss public concern as naivete, failure to understand the intricacies of our complex business, or over-reaction to media sensationalism.

Rebuilding Public Confidence

No matter how these problems resulted, we must rebuild public confidence by continuing to idenify and correct procurement problems.

The Department of Defense was recently reorganized to strengthen the management of many key programs including those related to acquisition and support of weapons systems. The position I hold, assistant secretary of defense for acquisition and logistics, lets me devote priority time to overseeing the acquisition process at the Department of Defense. We have been looking very closely at the acquisition process.

New Approaches Are Needed

I believe the majority of current legislation is based on the premise that the Department of Defense needs assistance in reforming the way we purchase systems, equipment, and materiel. The impetus for many of these reforms has been the "horror stories" on hammers, coffee pots, or other spare parts. Whether they are individually justified or not, these stories, are not indicative of our current acquisition system as a whole.

We can improve the acquisition process only in direct relationship to the availability and application, across the board, of a sufficient, and well-qualified and professional workforce.

A sense of proportion is lacking. Questions have arisen about the wisdom of this legislation. These questions stem from doubts that the legislative process lends itself to management system procurement reform and the minutiae entailed. While I am convinced we are *not* doing as badly as some perceive, I am equally convinced that *there is room* for significant improvement.

I plan to work closely with the Congress and, through cooperative effort, will attempt to assure that what is enacted in the future is workable. We must work to re-establish congressional confidence in our procurement activities. We must demonstrate our capability to take charge of the procurement process and to mold a flexible system of regulations with economies and mission requirements fully considered in the decision process.

Let me take you through the six areas of acquisition reform I believe are the most important as we look to the immediate future.

Quality

Quality is on the top of our agenda for the future. Historically, quality has been the hallmark of American service and products. In recent years, this image has been tarnished. Management in the United States has traditionally relied on the concept of an "acceptable

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level of quality." This has tended to be the minimal amount of quality to remain competitive or, in Department of Defense terms of reference, to satisfy minimal contractual requirements. This concept of minimal quality must be replaced with a philosophy of continuous quality improvement.

In DOD acquisition, "to the low bidder mentality" is too pervasive. As long as this persists, there is no reason for contractors to make quality improvement a way of life. However, we intend to find new ways to consider quality history in the source-selection process, and to reward high-quality performance. We plan to move away from defining equipment requirements in minimally acceptable terms to a system whereby affordable excellence is our recognized objective. In other words: policy of competition for excellence along with competition for price.

Let me discuss one of my favorite aspects of acquisition reform.

The Workforce

The defense acquisition workforce provides the foundation of all our defense acquisition improvement efforts. We cannot hope to solve the myriad acquisition problems simply by establishing initiatives or enacting legislation. The fact is this: We can improve the acquisition process only in direct relationship to the availability and application, across-the-board, of a sufficient, and well-qualified and professional workforce.

Although the Department of Defense has a good acquisition workforce, we need better qualified people. To attract and retain a talented cadre of professionals with the proper backgrounds and experience, we need changes in pay structures, rotational programs, and training; more flexible DOD-wide personnel procedures; and, real opportunities for upward mobility by rewarding experience and competence.

The establishment of a defense acquisition corps of highly professional acquisition managers would serve as the basis for needed personnel reforms. This corps, comprising civilian and military, educated and experienced acquisition personnel, would work for their respective service or agency—depending on need. The Office of the Secretary of Defense would provide

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centralized control with advice from the services. Many details concerning this proposal require clarification, particularly regarding the need for legislative support. However, I believe a defense acquisition corps would provide the needed impetus to meet the complex challenges of defense acquisition managment.

The Process

In order to capitalize fully on an improved workforce and defense products, we need to consider impovements to the DOD acquisition organization structure. We need new emphasis on streamlining the acquisition process by providing appropriate flexibility in the management process while establishing clear lines of authority and accountablity. The basic goals of organizational reform should seek to reduce the layers through which the program manager reports, increase program-manager responsiblity and accountabilty for all aspects of program execution, provide program-manager access to senior acquisition executives with decision authoriy and control of resources, and address Department of Defense needs.

Requirements

As I said earlier, one aspect of fixing the process is further integration of the DOD streamlining iniatives. We need to expand the streamlining concept to include optimizing functional requirements. The current system design and development process is not oriented to emphasize cost tradeoffs and optimization. There is insufficient interaction among users, developers, and manufacturers regarding design alternatives and cost tradeoffs. In addition, we need clearer lines of accountability, and visibility for the specifications and requirements match, particularly during the early phases of a program.

Manufacturing

There is little question that the Department of Defense push to make greater use of the latest technology and manufacturing systems in defense contracting is paying off. Recent advances like flexible manufacturing systems offer great promise. These computer controlled and integrated machines, work stations, transfer mechanisms, and tooling allow production of a variety of products in small numbers; moreover, they are suited to the DOD

There is little question that the Department of Defense push to make greater use of the latest technology and manufacturing systems is paying off.

manufacturing and productivity improvement important to the economic revitalization of our nation.

To further promote this objective, we are interested in ways to revamp and restructure existing programs and policies. Pricing and profit policies are being reviewed in this light. Cost accounting procedures may need to be revised to reflect the ever decreasing direct-labor component of system costs. We need to increase the manufacturing expertise of Department of Defense and contractor personnel.

Defense/Industry Relationship

Finally, meaningful progress to improve the acquisition process—thereby ensuring the most cost-efficient national security—must be attained within the framework of a positive, and proper relationship between the Department of Defense and industry. Participation, action, sensitivity, and leadership by industry are essential elements to the stable and productive relationship we seek. Industry has taken important steps to improve relations, like more direct interaction between the Department of Defense and senior industry executives.

The department has achieved major improvements in the acquisition process in recent years. However, significant problems remain; therefore, we must press on with the reform underway and seek new and constructive steps. The time is right for a bold and new direction to give the needed impetus to our efforts.∎

Processing Change Improves Efficiency For Various Army Depots

Soldiers in the field are getting supplies from New Cumberland (Pa.) Army Depot faster because of a change in the computerized processing of materiel release orders (MROs). Computer programs were rewritten to reduce the computer run-time required to produce MROs, which are the pull tickets (documentation) to pull, pack and ship stock.

The changes will allow MROs to be printed in at least 25 percent less time. This means that on a busy day (when 12,000 to 13,000 MROs may be generated, requiring 6-8 hours to run the program) needed documents are being produced up to two hours earlier. The Depot System Command (DESCOM) has greater flexibility to meet day-to-day workload surges. Various depots are coping better with routine workload stoppages like computer hardware failures or power outages.

The Logistic System Support Activity (LSSA), Chambersburg, responsible for the central system design of the MRO processing system, asked DESCOM in late 1984 for permission to isolate resources in order to re-write the system. Originally designed in the late 1960s and modified in the 1970s and 1980s, the system had been overtaken by changes in concept and environment. From the depot's standpoint, the new system has obvious advantages: MROs are available earlier, which is particularly important when large volumes are received unexpectedly. On an average, the New Cumberland Army Depot and DESCOM's second busiest area oriented depot, Red River in Texas, have a 25 percent reduction in the computer run-time needed to create MROs. Simpler restart and recovery procedures save personnel time and eliminate the loss of data, making life easier for the Directorate for Information Management.∎

Creating High-Performing Programs

By Modeling, Assessing, and Implementing Excellence

Major Eddie Mitchell, USA

The DOD program manager's challenge is to build and run an excellent, high-performing organization. He is expected to produce a weapon system for a reasonable price, within a reasonable amount of time, which efficiently performs its designated mission. However, only a few PMs achieve this goal with great satisfaction and recognition. Too many programs produce expensive, less than satisfactory weapons; and some PMs are fired outright.

Why don't we produce more excellent programs? Well, it isn't because PMs volunteer to create poor or average organizations or willingly manufacture shoddy weapons. In fact, both civilian and military PMs are chosen because of their demonstrated professionalism, dedication, and ability to produce under pressure. A possible reason for not achieving program

> *Most rational managers who can recognize a problem place sufficient sources against the difficulty to eliminate it.*

excellence is that known forces overwhelm the PM's goal setting, organizational structuring, and control actions. This situation does happen in some cases. But, most rational managers who can recognize a problem place sufficient resources against that difficulty to eliminate it. So it is more reasonable to believe that excellence is blocked by unrecognized or unknown future risks. These unforeseen problems catch the PM unprepared and without sufficient resources to handle the situation satisfactorily.

What prevents PMs from seeing these risks to their programs? The major problem is that PMs lack a practical model for recognizing what differentiates a high-performing system from an average or poor one. In fact, the organizational designs they have been taught, through literature and

M1 tank and 120mm guns
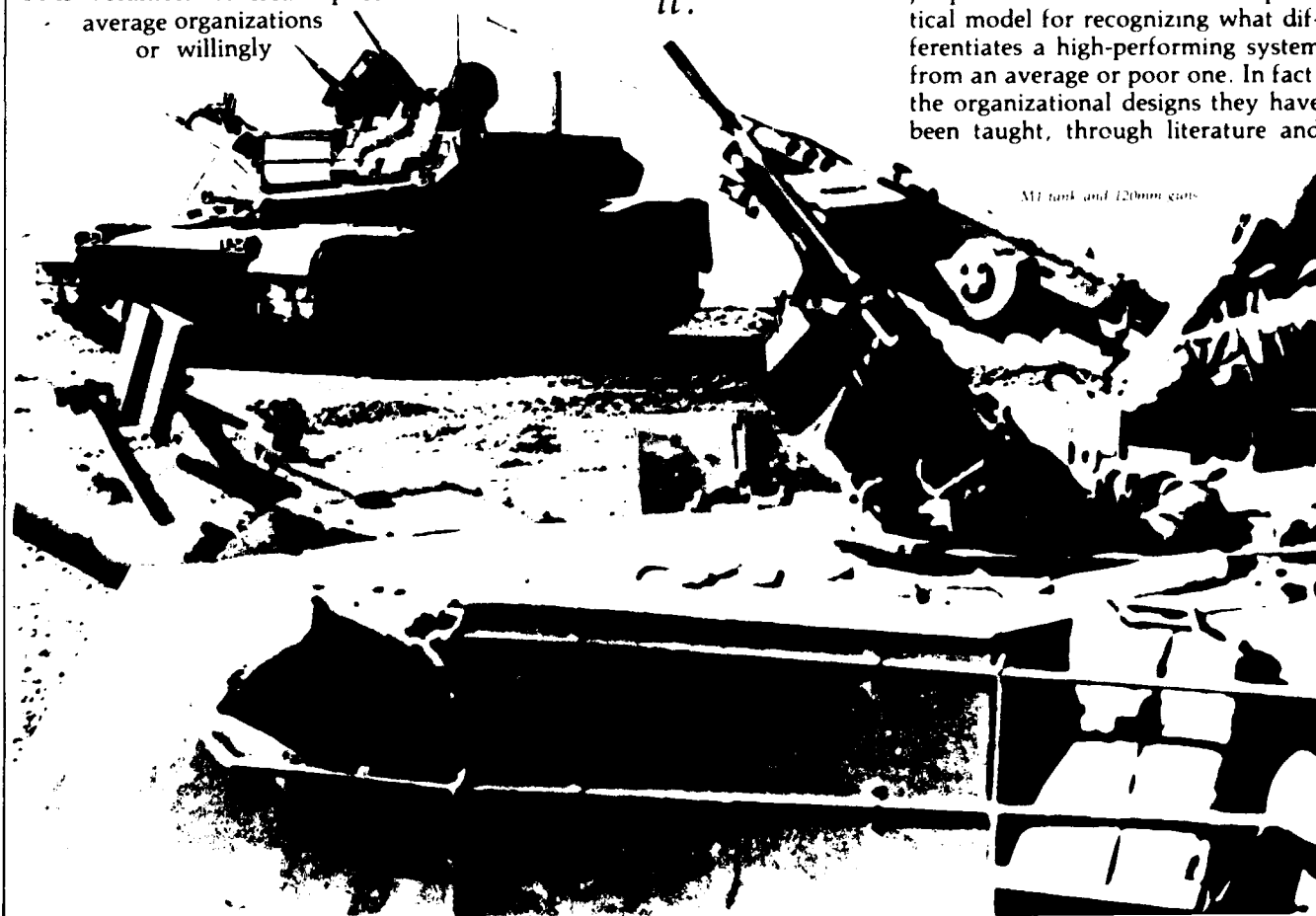
college, approach management in terms of how to produce improvements—not how to produce excellence. There is a significant difference in improving from poor to average versus creating top performance in a program.

This incorrect education has been institutionalized by the government's process of developing and presenting weapon acquisition directives. The regulations provide experiential improvements to the acquisition process and describe the sequencing of hundreds of procurement tasks. However, the jigsaw puzzle of regulations only states what must be done. Whether these tasks contribute to excellence and how to perform the tasks well is left to the PM.

Therefore, most PMs assess their program's performance with an improvement model, task-sequence model, or risk-avoidance model but not with a high-performance model. And, these assessments lead to costly, time-consuming corrections that don't produce excellence.

The program manager's inability to *model, assess,* and *implement* high performance is the major barrier to program excellence. The PM is much like the captain of a ship who navigates based upon an incorrect, but widely accepted theory of how the world is shaped. If you believe the world is flat and you'll fall off if you sail too far from land, then you unwittingly limit your ship's performance. But, if you recognize the world is round, you behave differently and go far beyond what is expected of you.

Program managers can be taught how to use a high-performance model to consciously and deliberately recognize what constitutes a superior performing organization. They can be trained to assess their program's performance strengths and weaknesses and how best to move a program out of low or average performance. The remainder of this article explains how to recognize, assess, and implement high performance.

I. Recognizing High Performance

Common sense and experience teach us that there are some management ideas, behaviors, and structures that are better than others. Most often we don't see how a business puts together its ideas and actions, but we do see the end-product. And, we initially judge the superiority of the firm based upon the quality of those products. The tank company, ship, or aircraft with the most hits during annual gunnery is "better."

Modeling the phenomenon that there are good and poor ways to perform provides insight into recognizing, classifying, and predicting high performance. The Performance Arena, shown in Figure 1, is such a model.

The first recognition concept: The Performance Arena describes the types of poor, average, and high-performing businesses we see in our daily lives. It also shows that good or poor performance is caused by one of five basic combinations of ideas and implementations explained below.

Poor idea with poor implementation: Companies that attempt to implement a poor product idea with poor implementation skills fail quickly. A bad design coupled with bad manufacturing will not work. Many firms enter the market place annually. The firms using this combination of ideas and action don't survive. A writer who uses a bad story line or plot and can't spell exemplifies this sector of the arena titled, "Incompetent."

Poor idea with good implementation: Companies that have excellent MBA, production, and distribution skills while pushing a poor product also fail. The ugly, unsaleable at any price, Edsel car was produced by a firm with excellent implementation skills, but it cost the company dearly. The Army's

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■ *Major Mitchell is a space systems analyst in the Strategic Defense Command, Huntsville. Ala. He is a PMC 84-2 graduate.*

Figure 1. The Performance Arena
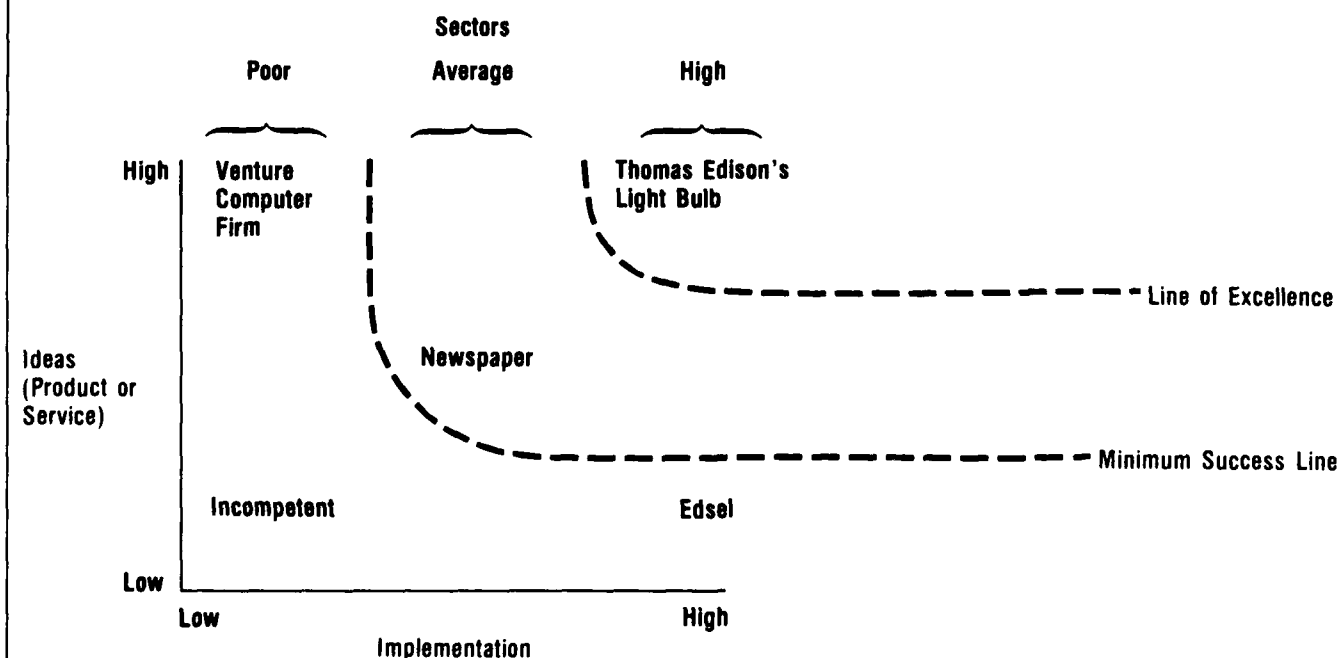
DIVAD air defense gun or the MX missile's original basing modes may fit into this category.

Good idea but poor implementation: In the last 10 years, numerous venture computer firms with great software or hardware ideas sprang up in California, rapidly expanded, and then crashed. Such companies had a very saleable product but failed because their creative founders lacked basic management skills, such as financial management or inventory control.

Satisfactory idea with satisfactory implementation: Firms that have sufficient management skills to field a satisfactory product for a long period are average performers. Periodically, they may peak perform or even lose money for awhile, but the vast majority of their efforts are average. A city newspaper typifies such a combination as long as it keeps costs down, sales up, and distributes a readable product on time. This business would stay above the minimum success line. The F18 aircraft and the M1 tank programs might exemplify such performance.

Good idea with good implementation: High performing companies skillfully implement good ideas and enjoy success while staying above the excellence line. Thomas Edison's production of the light bulb represents such a firm. Edison developed his superior idea, which we enjoy every day, by employing his excellent R&D and manufacturing skills. General Electric's jet engines, the Boeing AWACS, and the Army Blackhawk helicopter are examples of high-performing programs.

The second recognition concept: Movement from low performance to high performance requires balance combining or integration of increasingly better ideas and better implementation. The quality of the ideas and action skills limits how far an organization can go in the Performance Arena. The lower-quality idea or implementation factor in a performance combination is the one that prevents the firm from moving higher in the arena. No amount of improvement in the better factor will increase performance. And, poor implementation can kill any good idea. This limitation factor is why a computer firm can't attain success with just a great idea. It is why an Edsel will not sell no matter how efficiently MBA skills are applied to its financing,

manufacturing, or distribution. In fact, the real constraints to an organization are not physical but are poor ideas and poor implementation skills. The challenges that face an organization are overcome only with ideas and action. The Wright brothers did not have wings; however, their ideas on light engine flight and production skills powered them into high performance.

But, what goes on inside an HPS that allows it to integrate increasingly better ideas and better implementation? In the last decade, management thinkers like Vaile, and Peters and Waterman have studied excellent performing organizations to answer this integration question. After 6 years of
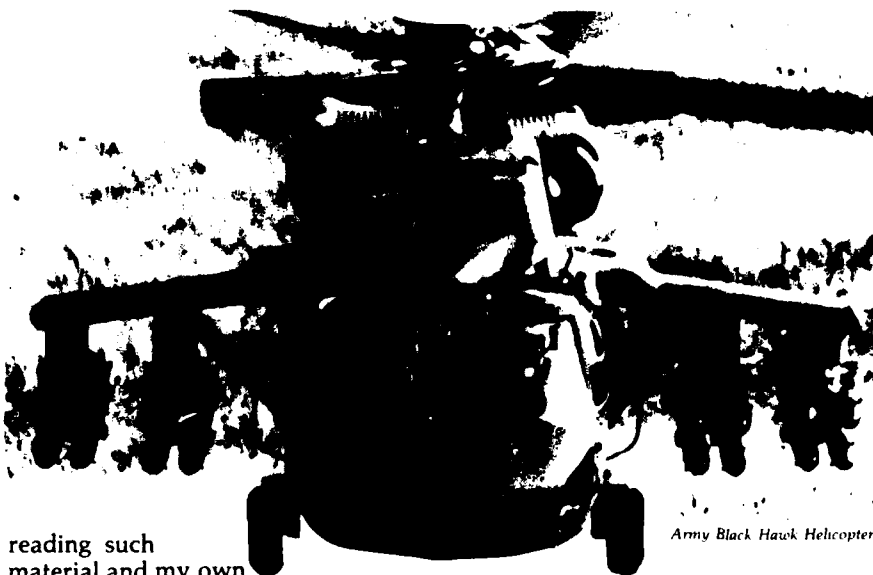
reading such material and my own field research, I developed the high-performance system definition and model to define high-performing system (HPS) components and their interfaces.

The third recognition concept: A high-performing system performs a repetitive, but not necessarily simple, activity in a time-constrained and stressful environment to achieve a clear-cut value and milestone goal. Its leadership group actively seeks specific positive and negative feedback and takes corrective action in order to consistently achieve superior results. Examples of organizations that fit this definition are the Dallas Cowboys, the Lucas and Speilberg mo.ie company, as well as the TOW missle system. The HPS model is shown in Figure 2.

The fourth recognition concept: The components of a HPS are more complete, more fully used, and more

thoroughly interfaced than in lower-performing organizations. This completeness allows the HPS to integrate, generate good ideas, and skillfully implement better than poor and average organizations. So what is a complete component?

A complete goal has value, milestone, and clarity aspects. The value aspect affirms the goodness of the organization's effort; the value energizes the group to do the tasks necessary to achieve the goal. The milestone aspect states a definitive act or physical happening. The clarity aspect ensures that a person doesn't have to guess what the organization is doing or where it is headed. A com-

Army Black Hawk Helicopter

An example of a clear goal might be 'Protect America's freedom of the seas by developing a 600-ship Navy by 1995.'

plete goal simplifies the HPS' integration process by increasing group consensus and teamwork and reduces questions, disagreements, and instructions. An example of a clear goal might be, "Protect America's freedom of the seas by developing a 600-ship Navy by 1995."

Figure 2. The HPS Component Model

Environment

(Stress and Time Constraints)

Leadership Group   **Task Activity**   **Goal Clarity**

Feedback
Goal = Where Are We Going?

+ /-Status = Where Are We Now?
Needed Corrections?
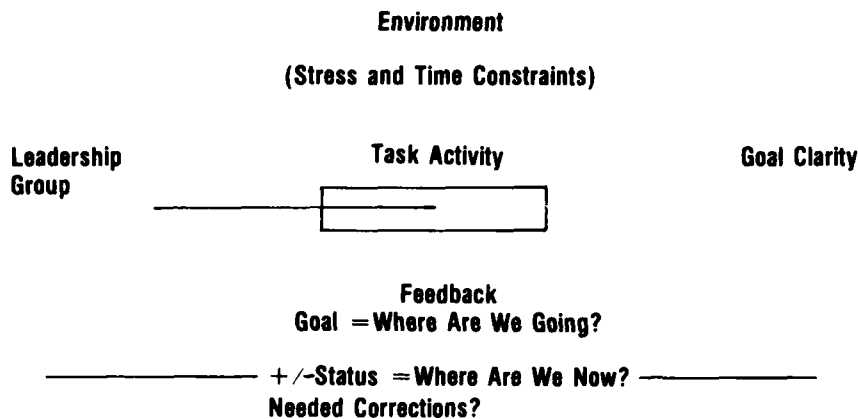
Complete feedback answers, in a timely manner (three questions). #1: "Where are we going?" This question keeps the organization checking if its goal is clear, if it is a proper goal, or if it needs changing.

#2: "Where are we now?" The answer to this question provides positive and negative, on or off target information. It lets the organization know if it should continue doing what it has been doing or change some of its behaviors. Only receiving negative, management-by-exception feedback throws a company off course by causing oscillating corrective actions. Therefore, the firm needs both positive and negative information. The HPS organizations reinforce the positive goal, supporting behaviors more than punishing off-target behaviors.

#3: "What are the needed corrections?" Corrective answers provide leaders a path to their goal by tapping the creativity of the members who daily struggle with company problems.

A healthy, complete leadership group actively seeks positive as well as negative feedback to identify and implement action to produce results. The leaders encourage innovation and use of creative input from personnel inside and outside the organization. The leaders continually focus the company on its goal and live the value aspect of that goal.

A complete task activity is characterized by technically proficient personnel. These people perform well the basic organization tasks, continually improving their implementation skills, and consistently producing output satisfactory to the user. A championship football team is an example of an organization with a healthy task activity component.

The HPS views its environment as full of stakeholders, and that the user is the dominant stakeholder. User satisfaction with the product is critical so good reputation or goodwill must be maintained. The HPSs adapt to their environments to maintain their excellent performances. They see a dynamic environment populated with known and emerging competitors. A food company reducing salt in its product to respond to consumer demand is an example of organization adaptation to maintain performance levels.

An analogy of a complete and incomplete system could be two people driving to work. The first driver's goal is to get to work safely by 8:00 a.m. each workday. Upon entering his car, he quickly checks how much time he has, if the car is running well, and if the mirrors are set. While driving, he pays attention to road and traffic conditions and anticipates problem areas such as congested on and off ramps. He maintains several car lengths between his car and the one to his front. He listens to the radio for traffic alerts and periodically self-evaluates his speed and how well he is driving. On time, with minimum stress, he reaches his job site.

The second driver's goal is to get to work on time. Upon entering his vehicle, he immediately starts the engine; it backfires and runs roughly because it needs tuning. Next, he shoves a cassette into the radio and begins driving. While motoring along, he adjusts mirrors and runs a comb through his hair. He enters the freeway while concentrating on a project he has at the office and almost runs into another car. Angrily, he swears and gestures to the other driver. Several miles down the road, he gets slowed down as traffic trickles by an accident. After passing the bottleneck, he speeds up and tailgates several people until they pull out of his way. On time, but upset, the second driver reaches his job site.

Which driver more nearly behaves like a HPS? If you were an insurance agent, which driver would you prefer to insure?

The fifth recognition concept: Organizational high performance is actually a series of individual and small group high performance. A championship football team needs consistent, excellent individual and special team blocking, running, passing, and kicking in order to win a game and a season. Similiarly, a R&D program needs small groups and project teams to develop superior concepts, negotiate well, and build prototypes in order to provide an excellent product.

The recognition summary: Studying high-performing individuals, small groups, and organizations helps clarify the risks confronting a program manager. The major risk to an acquisition effort is that it will be blocked from high performance because the program manager and his major subordinates cannot recognize, assess, and implement excellence. Thus, assigning PMs who don't understand how to establish a HPS gambles with America's future. This risk can be avoided if PMs understand the following concepts about high-performing systems:

—How well an organization integrates ideas and implementation skills determines if it will be a poor, average, or high performer.

—High performance can be achieved only by balanced integration of increasingly better ideas and better implementation.

—HPSs have five major components: goal clarity, feedback, leadership group, task activity, and environment. These components integrate ideas and action skills, consistently producing superior results.

Figure 3. Performance Assessment Guide (PAG)

Question   Rating

****Goal Clarity****

1. Is my program consistently producing superior results? How many of the program's projects, divisions, teams, or individuals clearly produce high-quality output?
2. What are the value and milestone aspects of the program's goal?
3. How clearly do program executive, staff, and line personnel understand the goal?
4. To what degree do program personnel buy into the program goal?
5. Does a team spirit exist in the program? Do people want to come to work? Does significant 'we-they' conflict attitude exist inside the program?
6. Can program members explain how their personnel or small-group efforts contribute to the program?
7. Can key program leaders explain what milestones or standby contingencies will be followed to the future? Do the explanations dovetail?
8. Do we need to change the program value or milestone goal?
9. How well does the program chain of command understand the HPS definition and model?
10. How does the acquisition strategy link design (good or bad ideas) with manufacturing (good or bad implementation)?
11. Is developing and maintaining a high-performing program part of the acquisition strategy?

****Feedback****

1. What formal and informal feedback process is used in the program? Are they timely and effective?
2. Are we on or off target to our value and milestone goals? Are we above or below cost? Are we ahead or behind schedule?
3. How often are people rewarded for good ideas, good implementation, or good integration?
4. How often does goal and status feedback lead to corrective action or do we continue on as we have in the past?
5. What changes occur because of positive or negative feedback; positive or negative quality assurance reports?

****Leadership Group****

1. Do the PM and other visible program leaders live the value aspect of the program goal?
2. Does the PM check on and hold people responsible for high performance? Does a spirit of excellence exist?
3. Does the top of the program actively seek ideas from all levels of the program?
4. How often do the program leaders willingly seek positive and negative feedback? Do they hide from problems?
5. How often do the program leaders seek advice from people with expert skills needed late in the program's life, such as production engineers or deployment specialists?
6. Do the program leaders push improvement ideas into action or studies? Are the leaders decisive?
7. Are the leaders optimistic, confident, and encouraging? Do they emphasize the positive over the negative?

—The components of a HPS are more complete, more fully used, and more thoroughly interfaced than in lower-performing organizations.

—Organizational high performance is a series of individual and small group high performances.

II. Assessing for High Performance

The outcome of a performance assessment is to identify which HPS components are incomplete or improperly interfacing and blocking excellence. These hindrances are then targeted for elimination.

A PM who learns the HPS model can check out his program easily, continuously, and informally. He can use a small team to conduct the assessment periodically or during the normal program review process. The team can develop a set of performance questions, tailored to the program they are working on. The Performance Assessment Guide at Figure 3 is an example set of questions. The team can then use historical records, observations, interviews or questionnaires to gather data.

The answers to the performance questions can subjectively be rated as:

Red = Unsatisfactory condition

Yellow = Marginal satisfactory condition

Green = Satisfactory condition

Each HPS component can then be judged as:

Incomplete = 50% or more red answers

Marginally Complete = 50 % or more yellow answers

Marginally Complete = Mixed answers some red, yellow and green.

Complete = 50% or more green answers

Next, an overall system rating can be assigned such as:

High Performance = All five HPS components rated green

Average Performance = Mixed green and yellow HPS components

Figure 3 (cont'd)

8. Does the program structure support the program goal and high performance? Who has or shares program-level responsibility to manage the HPS components?

9. How are small group and individual high performance supported by program leaders in each of their areas of responsibility?

****Task Activity****

Integration Tasks:

1. What acquisition phase are we in and do we need to start generating different types of ideas and using different implementation skills?

2. How well do we manage configuration items and engineering changes? How well do we manage technical integration?

3. Does the left hand know what the right hand is doing? How well do we integrate?

4. How often are we being surprised by an unseen or unexpected problem? After the problem surfaced, did we learn someone in the organization had been trying to warn us of the problem's existence?

Idea tasks:

5. What is the routine and critical idea-generating process of the program?

6. How good is the design idea we have; is it shoddy or good?

7. Is the program generating new ideas and innovations? Is it improving or holding steady?

Implementation tasks:

8. What are the routine and critical implementation skills presently used in the program?

9. What implementation skills will be needed by the program during the next 12—24 months? Does the program presently have those skills?

10. Are the program executive, staff, and line personnel implementation skills improving or holding steady?

11. Do we have a high-skill level in each of the major program offices? How good are our manufacturing skills?

12. Are we performing basic, routine, and administrative tasks well?

****Environment****

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1. Who are the stakeholders in the program? Are they knowledgeable of the program goals and to what degree do they accept the goal?

2. Does the program have a positive or negative image (goodwill) with the user and the public?

3. Is the actual user getting to influence the weapon system development?

4. What is a positive future environment scenario and what is the probability it will occur?

5. What is a negative future environment scenario and what is the probability it will occur?

6. What and how well is the program doing to avoid the impacts of a negative scenario?

7. Who are our traditional and non-traditional competitors? What are they doing, are they catching us, and can we learn from them?

Low Performance = One or more red HPS components.

In summary, assessing for high performance is done easily by using the high-performance system model and standard organizational assessment techniques. The assessment is a practical, informal or formal control technique and the ratings simplify communicating organization performance strengths and weaknesses. This methodology understandably shows if a program is conforming to a high-performing system and how well it is producing quality ideas, implementation, and integration.

III. Implementing High Performance

A program manager is much like a moderately experienced cook assigned to prepare a five-course dinner. The likelihood that the cook will provide a good meal greatly depends upon the recipe he chooses and how well he follows it. Now, DOD PMs have experience running military units but usually are assigned as a program manager only one time. So most PMs have only moderate experience in controlling the complexity of a weapon acquisition effort. Thus, the organizational concept or recipe employed is critical to the success of the program.

The high-performing systems concept is a superior organization recipe. The HPS approach allows the PM to employ previously developed skills in a manner that provides greater assurance of developing excellence in the program. The HPS approach is holistic integration, organizational structuring, controlling, and problem solving.

By conducting a performance assessment, the PM identifies barriers to excellence residing in or among the HPS components. Then, he sets out to eliminate the barriers and ensure each HPS component is complete and thoroughly interfaced. Standard

Figure 4. Basic HPS Implementing Actions

****Goal Clarity Actions****

1. Write out the program goal and verify its value, milestone, and clarity aspects. Publish the goal and update it as necessary.
2. The PM lives and advocates the value aspect of the program goal.
3. Implement a deliberate strategy to build program high performance:
   —PM establishes organizational structure supporting complete HPS components.
   —PM assigns program-level responsibility for each HPS component.
   —PM establishes processes that support HPS component completeness and interfacing.
   —A portion of the acquisition strategy addresses how high performance will be developed in the program and incentivized in the contractor firms.
4. Establish award fees to the contractor based on the government assessment of the contractor's HPS completeness or health.

****Feedback Actions****

5. Require HPS assessments as part of the formal program review process.
6. Conduct formal and informal HPS component completeness assessments.
7. Allow PMO members to assess, by questionnaire, the HPS completeness or health of the program.
8. Chart and conspicuously display the PMO's HPS component and overall system ratings.
9. Publicly reward creative ideas, improvement action, skillful implementation, and good integration.
10. Publicly reward leadership members for actively seeking positive and negative feedback.
11. Demand realistic test and evaluation and quality assurance.

****Leadership Actions****

12. PM and key PMO leaders demonstrate high-performance behaviors to the other program members and to the contractor. Program leaders act as HPS role models.
13. Program leaders live the value aspect of the program goal.
14. Program leaders routinely ask program and stakeholder personnel for feedback, ideas, and action plans.
15. Program leaders demand timely feedback and then convert feedback into action.
16. Leaders motivate people by emphasizing their positive goal-supporting behaviors.
17. Leaders employ situational leadership styles as necessary.

****Task Activity Actions****

18. Train newly assigned program personnel, especially senior leaders, on the program's goal, the high performance model, and how integration is accomplished within the program.
19. Conduct a deliberate training program throughout the acquisition life cycle to develop high-performing individuals and small groups.
   —Teach how to recognize, assess, and implement high performance.
   —Teach ideal generation techniques.
   —Teach advanced implementation skills.
   —Teach integration techniques.

20. Foster social and teamwork activities.
21. Allow innovative implementation.
22. Hire the best quality personnel possible while ensuring people skilled in idea generation abilities are balanced implementors.
23. Analyze DAR/DOD directive to determine which HPS components the regulations impact and integrate their use to improve the HPS components.

****Environment Actions****

Deliberately manage the program's goodwill. Establish a program marketing or user-liaison manager co-equal to the technical, ILS, etc., managers.
25. PM ensure actual users are continually tapped for feedback. Pay for users to visit the program and comment on the weapon design, manufacturing, and deployment.
26. Conduct future strategic forecasting to anticipate likely major environmental changes.
27. Study threat and foreign competition for better weapon system ideas.

problem-solving techniques can be used to eliminate specific barriers. Figure 4 lists 27 basic implementation actions that can be employed to foster program high performance.

These 27 actions establish a clear goal, build an organizational structure supporting high performance, and assign senior staff managers responsibility for each of the HPS components. The suggested actions institutionalize HPS behaviors and procedures into the program. Behaviors are institutionalized by conducting individual and small group training on idea-generating techniques, professional skills, and the HPS concept. The HPS behaviors are reinforced by a rewards process that recognizes members who generate good ideas, skillfully implement, or integrate well. Procedures are institutionalized by running a formal assessment and review process that monitors program HPS performance as well as technical development of the weapon system.

Most of the 27 implementing actions are not new ideas. However, deliberately managing them as component sets because of their synergistic impact on performance is new. The 27 implementing actions assist the PM in keeping a five-component focus. The

It is possible to create a good team to develop new ideas and skillfully turn those ideas into reality.

27 actions help him achieve sufficient completeness in each component to become a high-performing system.

IV. Conclusion

It is possible to create a team as good as the Wright brothers or Edison's laboratory. It is possible to develop good ideas and skillfully turn those ideas into reality. You do it by developing a holistic understanding of what makes up a high-performing system and then assess your program against the HPS model. Then, you systematically take action to eliminate the barriers to excellence and ensure complete HPS components exist in your program.

The PMs who employ the HPS model, assessment, and implementation process will overcome the complexity found in major programs. At the end of their tours, they will be able to look back and proudly say: "I was part of an excellent program. We made a great weapon system." ■

F-18A Hornet with Sidewinder and Sparrow Missiles

New X-Ray Unit
Boon to Materials Testing

"Show and Tell," the game that can make a child beam with pride, is being put to the test at the U.S. Army Materials Technology Laboratory (MTL), Watertown, Mass. And, if seeing is believing, MTL's Non-destructive Evaluation (NDE) Branch (Mechanics and Structural Integrity Laboratory) is seeing more than ever.

The MTL new source of pride is a high-energy X-ray machine. The Varian Linatron is showing materials' characteristics and shortcomings and allowing the lab to perform quality control and assurance. Its enhanced X-ray capability is being used in the non-

destructive testing of materials more than one-inch thick steel or its equivalent, such as depleted uranium, tungsten and armor plate. The Linatron will be used mainly on materials specimens, armor plate, bridging, armaments, and vehicle components.

"This new equipment will significantly benefit and support MTL's materials analysis capability," says Alfred L. Broz, NDE Branch, "especially in our armor and penetrator programs.

The Varian Linatron is one of the most modern X-ray machines available, according to Broz, and produces

excellent film resolution. In fact, the Linatron is used in hospitals as an X-ray source. The Linatron can "see" into materials up to eight inches thick and is ideal for material one to eight inches in thickness.

The unit has been up and running since June. "This type of X-ray inspection helps ensure quality assurance and quality control for materials in manufacturing processing....The materials that we are now inspecting and testing will, in the future, be of the highest quality as they are incorporated into the defense systems used by American soldiers in the field," says Broz.

The U.S. Army Program/Project Manager Selection System

Dr. Julius Hein

What is a program/project manager? He or she exercises full-line authority and responsibility over all planned direction and control of tasks and resources in developing, testing, producing, fielding, and supporting a weapon system.

Another answer: A program/project/product manager has authority to make things happen, to receive praise if events are successful, and blame if milestones are not met in scheduling, funding, fielding, and supporting. Program managers find their positions exciting—PMs are in the drivers' seats and many actions are performance motivated; they are in the "limelight," and, of course, make contributions to their services and their country.

Likewise, a PM assignment can make or break people in their career assignments.

Let us explore significant actions and prerequisites an officer must have before being selected as a program/project manager.

The most important regulation that covers the project manager selection system is Army Regulation (AR) 635-100. General Maxwell Thurman, vice chief of staff of the Army, issued some new, additional requirements for the selection process. General Richard H. Thompson, commander of the U.S. Army Materiel Command, initiated a new and major upgrade in the status of project managers by making selection compatible with selection of the command list. General Thompson said: "PMs will be announced with the command list and be truly commanders."

Significant and pertinent highlights for the project manager selection systems, listed in Chapter 8, AR 635-100, and apply to active duty of-

ficers competing to be selected. Other highlights are as follows:

—Deputy Chief of Staff for Personnel (DCSPER) establishes eligibility criteria for project manager selection.
—The DCSPER exercises general staff supervision over project manager selection system and related policies.

A

PM can make things happen, receive praise if events are successful, or blame if milestones are not met.

—The commander of the Military Personnel Center (MILPERCEN) announces the convening of the project manager selection board and subsequent sessions.
—The commander of MILPERCEN determines assignment priority in the event an officer is selected for 06 command and for project manager.
—The commander of MILPERCEN activates alternates, if required, to fill project manager vacancies.
—The Secretary of the Army, or authorized representative, will direct the Army Materiel Command to convene a project manager selection board to consider officers for selection as project managers on projects with programmed vacancies during the follow-

ing fiscal year. Fiscal 86 is the transition year when switching from calendar year to fiscal year. (This is new and not yet covered in the Army Regulation.)
—The MILPERCEN will announce that the project manager selection board is scheduled to convene by sending out a worldwide message. The announcement will include selection board convening date, eligibility criteria, list of officers to be considered, an invitation to officers whose names *are not* on the list but who think they meet criteria to request consideration, and an invitation to officers whose names are on the list and who want to decline to submit a letter of declination of consideration for a position selection *prior* to convening the board.
—Officers may decline project manager consideration without prejudice before the board convenes.
—Officers who want to be considered by a future PM board must revoke the declination in writing *prior* to the convening of that future board.
—Officers who decline *after* the board convenes will no longer be eligible for any future project managership or command consideration.

Changes of program managers normally will occur at major program milestones and will be scheduled to provide an overlap between the incoming and outgoing program managers. The normal tour of duty is a minimum of 3 years with a goal of 4 years where possible. To be eligible for consideration by the program manager selection board, the officer:

--Must be in the grade of colonel or a promotable lieutenant colonel
—Must be a graduate of the Defense Systems Management College 20-week Program Management Course
—Must not have declined any pre-

viously designated command, district engineer, or program manager position if selected as a principal

—Should have 4 years of service remaining

—Should be a member of a PM development program or possess an SC51—research and development initial or additional specialty

—Should have experience in at least one, preferably two or more, of the following: research and development, logistics, comptrollership, procurement, automatic data processing, communications and electronics, or operations research/systems analysis

—Should be a graduate of a senior service college, preferably the Industrial College of the Armed Forces

—Should have a baccalaureate degree, preferably in engineering or other physical science and an advanced degree in business, procurement, management, operations research and systems analysis, engineering, or physical science.

Eligible officers may be considered and dual-selected by the annual command boards and the program manager boards. Officers dual-selected by boards are programmed for assignment in one category only. These officers are not being deferred for later programming to the alternative assignment.

How does the board operate? It operates in accordance with the Letter of Instructions. The board will initially review records of officers to determine the fully qualified for selection as PMs and to determine those best qualified. The board will select a principal and three alternates, if available, for each position and rank them in the order of their qualifications.

When the board completes its report for a particular session, it will forward recommendations directly through ODCSPER to the approving authority. After approval, MILPERCEN will publish the list of principals and notify, in writing, the alternates.

Now that you know what a program manager is, how the selection board operates, and what eligibility criteria are, do not hesitate to prepare yourself for a challenging career.■

■ *Dr. Hein is the director of the DSMC Central Region, St. Louis.*

Meeting of the Minds

Forum on Artificial Intelligence in Management

Robert B. Bishop, Jr.

Artificial Intelligence has captured the imagination of the public and the press. Successful examples, reported in the technical literature, back up the claims of developers of Artificial Intelligence and Expert Systems. To explore these examples and examine how concepts can be applied best, the Defense Systems Management College has organized a Forum on Artificial Intelligence in Management (FAIM) to be held in Richmond, Va., May 18-21, 1986. The forum will bring together experts from industry and academia, and government leaders, who will have an opportunity to examine freely all the issues during the sessions planned.

The forum will focus on three main areas:

—How Artificial Intelligence can be utilized best by management for effective decision-making.

—What current programs are most useful and how they can be applied, and what lessons have been learned.

—What research areas must be addressed for future growth and application of Artificial Intelligence.

More than 200 technical papers and articles were reviewed related to Artificial Intelligence and Expert Systems

The forum will bring together experts from industry, academia, and government to examine all the issues.

as the basis for determining topics most suitable for discussion at the forum. Many experts provided ideas, research studies, and made commitments to ensure a truly high-level forum. Discussions in workshop settings are expected to provide useful input for future directions in research and applications of Artificial Intelligence in Management. In addition, a number of Artificial Intelligence systems will be demonstrated. Input from the participants and from the discussions will be made available after the forum.

Although attendance will be limited, persons who have significant contributions to make to FAIM are encouraged to contact the chairman, Mr. Harold J. Schutt, DRI-S, Building 205, Defense Systems Management College, Fort Belvoir, Va. 22060-5426; Telephone: (703) 664-4795/5783.■

■ *Mr. Bishop is a professor of engineering management in the Program Managers Support System (PMSS) Directorate at DSMC.*

"A gossip talks about others; a bore talks about himself; a brilliant conversationalist talks about you."

—Francis Bacon

Liberty lies in the hearts of men and women. When it dies there, no constitution, no court, no law can save it.

—Justice Learned Hand

Reviewing Your Contract

A Manager's Guide

Alan W. Beck

Most goods and services acquired by the government are purchased by contract. Managers should be concerned that contracts are structured to provide desired items or services for fair prices, at reasonable times, and with appropriate quality. Since contracts are a complex integration of government law, policy, and tradition with the peculiar goals and requirements of various specialists, some managers are awed or unsure about what to ask or what to look for in review of a contract. The purpose of this guide is to assist managers in understanding some of the fundamental policy considerations and where to look for basic information.

Summary Information for the Manager—The Acquisition Plan

Before looking at a specific complex acquisition contract, a manager will want to review an executive summary of what the contract is about.

On other than small repetitive buys, the contracting officer is required to prepare and maintain a plan with a summary of key management information on the acquisition. This acquisition plan, which is approved by the contracting officer and program manager, will vary in nature depending on the circumstances and stage of the acquisition but will include serveral standard content items. Foremost in the plan and in management review considerations are the background and objectives of the particular acquisition, including a statement of what the need is and acquisition alternatives. This will include special compatibility requirements or special performance constraints. Other information covered in the plan would be cost goals including life-cycle costs, designed cost objectives and assumptions, application of should-cost analysis, and detailed rationale for cost goals.

Other content includes:

Discussion of tradeoffs of risk in the technical cost and schedule areas.
—Potential sources for the acquisition including the plan for seeking, promoting, and sustaining competition throughout the acquisition.
—Special contracting considerations such as:
—Type of contract
—Multiyear contracting
—Options
—Special contracting methods
—Special requirements
—Deviations from the regulation
—A budgeting and funding estimate summary
—Explanation of the product descriptions or statement of work contents
—Special priority information management information requirements
—Make or buy applicability
—Test and evaluation program description
—Logistics considerations including logistics assumptions, reliability, maintainability and quality assurance requirements, planned use of warranties, planned purchase of contractor data rights
—Government-furnished property to be provided to contractors
—Environmental issues
—Security considerations.

This acquisition plan also includes milestones for the acquisition cycle for schedule tracking, and identification of participants in the plan preparation. The Department of Defense supplement to FAR Part 7 requires that the contracting officer coordinate all this information from the team of experts and that the head of the contracting activity (HCA) ensure that plan objectives are realistic and achievable.

Reviewing this acquisition plan is a useful way for a manager to understand the background and rationale behind a proposed contract.

Reviewing Contract

In addition to reviewing the acquisition plan to understand the scope and nature of the acquisition, a manager may want to review specific items in the contract. The place to start is with the contract award form, which some people call the cover sheet. This form includes a standardized table of contents for the contract known as the uniform contract format.

Uniform Contract Format

The cover-sheet provides several key items of information. The contractor's name is indicated on the cover as is the name of the office of the contract administration and payment. This contract cover-sheet is know as Section A of the uniform contract format.

After the cover-sheet, Section B provides a list of the items to be purchased under the contract. This list typically covers all the supplies and services and what the prices are for each item on the contract, provided the item is separatedly priced. Sometimes items in Section B are priced with the acronym NSP (not separately priced) which means that the price of that contract line-item is folded into some overall price for a larger set of items as indicated in the contract. Occasionally a price will be listed as TBD (to be determined) or TBN (to be negotiated). This is a signal flag that these particular items are in the unpriced category, probably because conditions at time of contract award were not appropriate for pricing the individual items.

Section C of the uniform contract format lists specifications. Here one may find the specification or statement of work indicating what the con-

■ Mr. Beck is the planning director for the enhanced Program Manager Course at DSMC.

Table of Contents

top			The following checked sections are contained in the contract				
(X)	Sec A	Part 1 - The Schedule Solicitation/contract form	Page	(X)	Sec I	Part II - Contract Clauses Contract clauses	Page
	B	Supplies or services and prices/costs				Part III - List of Documents, Exhibits and Other Attachments	
	C	Description/specs./work statement			J	List of attachments Part IV - Representations and Instructions	
	D	Packaging and marking					
	E	Inspection and acceptance			K	Representations, certifications and other statements of offerors	
	G	Contract administration data			L	Instructions, conditions and notices to offerors	
	H	Special contract requirements			M	Evaluation factors for award	

tractor should do. Some offices, however, will instead include detailed information (such as this) as an attachment to the contract. The clue to what is and what isn't attached is found under Section J of the contract, which is a list of attachments.

Uniform Sections D through F are relatively straightforward; Section D includes packaging and marking information; Section E, inspection and acceptance information; and Section F, information on the deliveries or performance—what laymen call the schedule; contract lawyers and procurement professionals refer to all of Sections A through H of the contract as the "schedule."

Section G is called contract administration data. Here, we find information including fund citations for the contract, and any special information for administration by the administrative contracting officer (ACO).

Section H is called special contract requirements. Before the FAR, this section was called special provisions. This is, perhaps, the most critical section of the narrative portions of the contract for the manager to review, for here are specially worded clauses or paragraphs pertaining to agreements.

Part 2 of the uniform contract format is Section I, called contract clauses. Before the FAR, this section was called general provisions. Contract clauses consist of those primarily preprinted standard language clauses that define the contractual agreement. Often, these clauses are in-

corporated in the contract by reference; that is, simply listing the paragraph number from the FAR or FAR supplement, the title of the clause, and the date for the clause. Although standardized, the clause selection varies according to the type of contract and nature of the product being procured so that fixed-price contracts have one particular list of contract clauses that defines the rights and responsibilities under fixed-price contracts. Cost contracts would have another set of clauses, and so on, for a specialized type of contracting like construction or services. This section may include specific implementing language for some general provisions such as percentages that fit into clauses, or dollar amounts that fit into clauses that are designed to manage the financial agreement of the parties. Part 3 of the uniform format is Section J, the list of attachments mentioned earlier. The last part of the uniform contract format, Part Four, is "Representations and Instructions." It consists of certifications and statements made at time of contract award, instructions to offerers seeking a contract, and the evaluation factors for awarding a contract. These last three sections K, L, and M are most relevant before contract award.

Management Review

The above basics provide a fundamental understanding for management review of contracts starting with a review of the acquisition plan associated with a contract, and then applying knowledge of the uniform contract format to look at the par-

ticular document and determine what it says. However, contracts for major systems tend to be voluminous and, although following the uniform contract format, tend to get complicated to review—particularly as changes accrue to the contracts. To maintain a summary perspective of the requirements of a particular contract, the attached contract information template will provide 10 key question areas for extracting particularly relevant information for management review.

Review Template

—Description of item for services being procured
—Contractor
—Contracting office/officer
—Type of contract
—Price information
—Delivery schedule
—Special contract requirements summary
—Major risks/uncertainity areas
—Contract adminstration information
—Special management comments.

Summary

Reviewing the fundamental agreements in a contract can and should be done by managers. The above information provides managers with top-level insight into assessing the goals and strategies of procurement. This is done through review of the acquisition plan, review of the actual contract document by using the uniform contract format and list of attachments, and by seeking key/special information items for top-level review of individual contracts.

However, despite the standardized format, each contract must be tailored to the particular circumstances appropriate for that acquisition. Selecting and developing the particular contractual language for each situation to be covered involves coordination of many experts in various fields. Synthesizing these into a legally enforceable contract to protect the interests of the government while being fair to the contractor is the responsibility of the contracting officer. The old joke about lawyers is: "He who acts as his own lawyer has a fool for a client."

Similar logic might apply toward the contracting profession. Seemingly minor word changes and even the context of words can have a nuance effect on the enforceability or effect of a contract. A wise manager will seek to develop and maintain knowledgeable contracting professionals to develop and implement contracting strategy in the best interest of the government.

Support and review emphasis from management can then make a difference in effective mission accomplishment. ■

Third Bridge Prototype

The Army Troop Support Command's Belvoir Research, Development and Engineering Center has awarded $612,000 to Bowen-McLaughlin-York (BMY), York, Pa., for fabrication of an additional prototype of a new mobile assault bridge system for the Army's heavy divisions. The experimental system consists of a 100-foot span, 70-ton capacity bridge mounted on an M-1 tank chassis. The double-folding design uses composite materials for key components to reduce system weight and deflection. This award is the first increment of a contract modification that will total $1.69 million.

In April 1983, BMY received the original $4.9 million contract covering design and fabrication of a single prototype to be delivered to the Army this spring. In February 1985, a $1.9 million award was made for a second prototype. The latest award for the third will bring the total value of the contract to nearly $8.5 million. ■

People on the Move

Bishop | Caldwell | Davis | Scott

Robert B. Bishop, Jr., is a professor of engineering management, responsible for modules development in the Program Managers Support System (PMSS) Directorate. His last assignment was supervisory electronics engineer, Naval Sea Systems Command. Mr. Bishop has two degrees in electrical engineering, a B.S. from the University of Maryland and an M.S. from New York University.

Lieutenant Colonel John E. Caldwell, USA, a professor of acquisition management, School of Systems Acquisition Education, came to DSMC from the U.S. Army Information Systems Command. Lieutenant Colonel Caldwell holds a B.S. degree and an M.S. degree, both from the New Jersey Institute of Technology.

Captain Clifford M. Davis, USAF, is the executive officer in the Office of the Commandant. He joined the DSMC staff after graduating with PMC 85-2. He previously served as manager, Antiarmor Weapon System, AFSC/SDZ. Captain Davis received a B.S. degree in education from the University of Southern Illinois, and an M.S. degree in management from Troy State University.

Christopher S. Scott is a professor of business management, School of Systems Acquisition Education. He trained as a foreign service officer with the Agency for International Development before joining DSMC. Before that, he was with the Naval Ocean Systems Center. Mr. Scott received a B.S. degree from the U.S. Air Force Academy, an M.B.A. degree from the University of Puget Sound, and an M.S. degree from American University.

Additions

Janice Baker to Acquisition Management Laboratory.

Peggy Dacey and Deberal Denson to Business Management Department.

TSgt John Garnish, USAF, to Audiovisual Division.

Sr Amn Pete Whiteside, USAF, to Graphic Arts Division.

Losses

Lieutenant Colonel John R. Bramblett, USA, assistant for contracts, Department of Research and Information, to MILPERCEN.

SFC Michael Hill, USA, Audiovisual Division, reassigned to Korea.

Jerome Goldschmidt, Navy Chair, to Office of Program Resource and Appraisal Division, NAVOPS.

Major David Putman, USAF, Acquisition Management Laboratory, to Defense Communications Engineering Center, Reston, Va.

MSgt Orville Wright, USAF, Audiovisual Division, retired.

PMC Notes

Jack Badali, PMC 83-2, has been promoted to weapons system manager—Team Chief at HQ Army Materiel Command. In January, he started a 1-year assignment in the Congress as a LEGIS Fellow in the office of Senator Robert Byrd.

"I have yet to find the man, however exalted his station, who did not do better work and put forth greater effort under a spirit of approval, than under a spirit of criticism."

—Charles Schwab, industrialist

Continuous Evaluation
The Program Manager and C² Tester

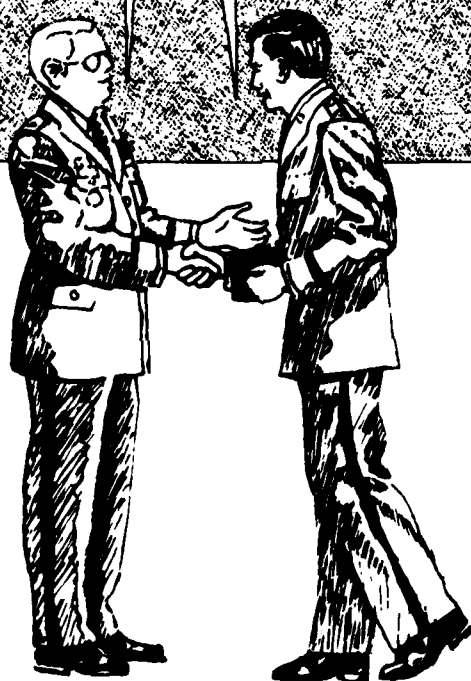*John L. Miles, Jr., and Mitchell J. Hazam*

> Hi. I'm from the independent testing agency. I'm here to help you.
>
> Sure.
>
> No kidding! Help is our function.
>
> Yeah, I've heard about the kind of help you give from other program managers.
>
> Hey, forget all that. There's a new deal now. It's called C²E....

That conversation probably has never taken place but it might. There is a degree of endemic skepticism between the test and evaluation (T&E) community and proponents of new systems. Also, there is a new deal called Continuous and Comprehensive Evaluation (C²E) which, in fact, holds the promise of fostering a more cooperative spirit between testers and developers.

Speed Vs. Assessment

Continuous and Comprehensive Evaluation is an Army program created to resolve a conflict between two important public needs: speedy system development and thorough performance evaluation. General Richard H. Thompson, commander of the Army Materiel Command, has ordered that new development programs take no longer than 4 years.[1] But speeding up the process allows even less time for testing—particularly operational testing—and the testers have already complained that there isn't enough time now to do the job right.

Continuous and Comprehensive Evaluation offers the hope of meeting both needs. First, it expands the time base when test and evaluation may be conducted. Instead of T&E "windows" in the acquisition process (up to three major design thrusts), the first "C" in C²E means that test and evaluation goes on how well it continues to perform in operational units. The continuous nature of C²E means that testers can stop fretting about when they can begin, and program managers can stop fretting about where to schedule T&E "windows."

Second, C²E can bring to bear on the evaluation of a new system a wealth of technical and methodological sophistication previously ignored because of time constraints. Given the

increased time in which to work, truly comprehensive evaluation is possible. (The advantages of a plan that permits spotting and correcting system problems early have not been lost on the Army leadership which not long ago had to justify to the Congress continued funding of a sophisticated weapon which, during testing, chose as its target a nearby latrine fan instead of the hostile helicopter advancing on it.) Continuous and Comprehensive Evaluation, as presently conceived by Army planners, will take advantage of the whole array of analytical tools, from simple effectiveness equations to complex computer models, to predict what the performance of a new system ought to be and then to tract what it actually is as its design matures.

Benefits to PMs

The benefits of C²E noted above accrue primarily to those in the T&E community. But, there are other benefits that will be noticeable by program managers. One of the several factors that led to the C²E program was pressure on the Army from the General Accounting Office (GAO). Its 1984 report, "The Army Needs More Comprehensive Evaluations to Make Effective Use of Its Weapon System Testing," noted "very little communication and coordination among" those Army agencies involved in T&E, and recommended integration of the various products of those agencies. In his reply to GAO, James P. Wade, Jr., principal deputy under secretary of defense research and engineering, identified the USA Operational Test and Evaluation Agency (OTEA) as the organization to centralize the evaluation function of new systems.[2] He noted that certain resources of other Army T&E activities would be made available to OTEA for the evaluation of new systems.

How does this help a program manager? Isn't this, in fact, a bigger tougher, more powerful group of testers ready to do battle with a program manager whose own boss expects completion of the program up to four times faster than ever before? It might have worked that way. Fortunately, all evidence to date is in the other direction. Major General William G. Tuttle, OTEA commander, commonly makes it clear that his job "is not to evaluate PMs or issue pass/fail grades for a system."[3] Dr. Phillip C. Dickinson,

OTEA chief scientist, adds: "If a system is in trouble, we try to help it get well."[4]

These attitudes are expected to express themselves by close, frequent contacts of the PM and members of the OTEA Test, Evaluation, Analysis and Modeling (TEAM) group. Through these contracts, the program manager will know and can help shape details of the long-term evaluation plan for the system. More importantly, he or she will know early what the ground rules are for measuring system performance, and will have regular and prompt notice of what models and interpretive aids will be used with actual performance data.

A significant part of the program manager's shaping of the long-term evaluation plan for the system concerns scheduling. The TEAM should have designed a proposed evaluation concept around functions to be performed by the system. Identificaiton of these functions follows easily from a well-written requirements documents and operational and organizational concept.[5] In the earliest stages of system development, only the functions will be known; allocation of these functions among hardware, software, and humans will occur later as system design concepts are proposed and evaluated against those requirements. A method for developing a system evaluation concept against functions alone is given in a recent article by Jonathan Kaplan.[6] He proposes that system effectiveness be the product of multiple subfunction effectiveness calculations. Particularly in the early stages of system development, that is likely to be a useful concept. However, as the system design matures and functions become allocated among hard-

ware, software, and humans, it is probably more efficient to transition from a straight function-model of effectiveness to component-model.

An Example

A practical method for building a component-model of system performance in the context of continuous and comprehensive evaluation is to employ the principle of comparability analysis. Under this approach, function allocations are assumed for early planning purposes. These assumptions can be made with reasonable validity using a chart such as in Figure 1. The test planners then build models of system performance in the two broad dimensions of effectiveness and availability (corresponding respectively to operations and maintenance/supportability) around the assumed function allocations. For example, in the case of a new ground-to-air missile to be transported and fired by a single gunner, the assumed function allocations (derived from a comparability analysis of REDEYE and STINGER) might be those shown in Figure 2. Evaluation planners know they will need data on how well each of those functions will be performed in order to predict with reasonable accuracy the likely effectiveness and availability of the new system when it is fielded. The planners construct mathematical models of system effectiveness and availability based on the assumed allocation of functions (Figure 2), and then begin to fill in each term of the effectiveness and availability equations with data from comparable systems (for hardware and software subsystems) or data banks (for soldier components). As the system matures in design and personnel selection criteria and training development, data in the equations can be

Figure 1. Relative Strengths of Military System Components

Hardware	Software	Personnel
Propulsion	Reliable and fast	Simultaneous -processing
Protection	mathematical computation	and prioritization of
Endurance	Reliable and fast control	many input signals
Magnification	of routine procedures	Fast, creative reaction
Conversion	Data storage (equivalent	to changing situations
Application of	of "remembering")	Leadership and motivation
energy	Routine communications	Spontaneous communication
Structural	Decision aiding	Intuition
support	Diagnostics	Planning

Figure 2. Hypothetical Allocation of Functions in New Air Defense System

Hardware	Software	Personnel
Target Detection	Target Identification	Portage
Propulsion	Fire Control	Position Selection
Guidance Execution	Calculations	and Camouflage
Energy Conversion	Guidance Control	Command and Control
ECM	Fault Diagnostics	Target Selection
Communications	Embedded Training and	Aiming
	Soldier Performance	Launch
	Assessment	Part Replacement

replaced with performance results supplied by the development contractor or government test activity. In this manner, the evaluations can, in fact, be continuous and not delayed by the scheduling of particular hardware subsystem tests.

Honesty and Flexibility

An astute program manager will be quick to see the implications of continuous, independent assessments of the performance of a developing system. First, to congressmen who, individually or as members of key armed services committees, express concerns about performances of new high-tech systems under the stress of wartime conditions, data (not mere assurances) can be provided. The data should decrease the congressmen's incredulousness and increase the Army's reputation for accuracy—both healthy changes.

Second, the existence of performance data early in a system's development should permit a new flexibility between the program manager supervising the development of the system, and the training and Doctrine Command (TRADOC)—which prepared performance specifications and the operational and organizational concept for the system. For example, early evaluations of data from comparability analyses might show projected system effectiveness or availability significantly below criteria in the TRADOC performance requirements. Although one alternative is obviously to press ahead with system development in the hope that actual data later will provide a rosier picture, it will now be possible for the program manager to go back to the combat developer with a request to validate (or at least reconsider) portions of the system

specification or O&O concept. This flexibility can be particularly important concerning functions allocated to personnel.

In the hypothetical example in Figure 2, one function allocated to personnel in the proposed system was "aiming." The error involved in aiming shows up disproportionately in calculations of weapon system effectiveness. As the Army Materiel Systems Analysis Agency (AMSAA)

noted in a recent report, "Improvements in system delivery accuracy normally yield greater gains in system effectiveness than corresponding percentage changes in any other major parameter."[7] Therefore, an intolerable deficit in system effectiveness may be susceptible to correction by a change not just to the system performance specification (i.e., accepting a lesser capability), but by changing the specification of the personnel component. In this example, the program manager could present the combat developer with at least three options:

Accepting the below-specification performance: Figure 3 shows hypothetical test data points of time and accuracy for the prototype new system used by trained soldiers plotted against the original TRADOC performance requirements (assumed to have been a

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Figure 3. Performance Requirements and Test Data
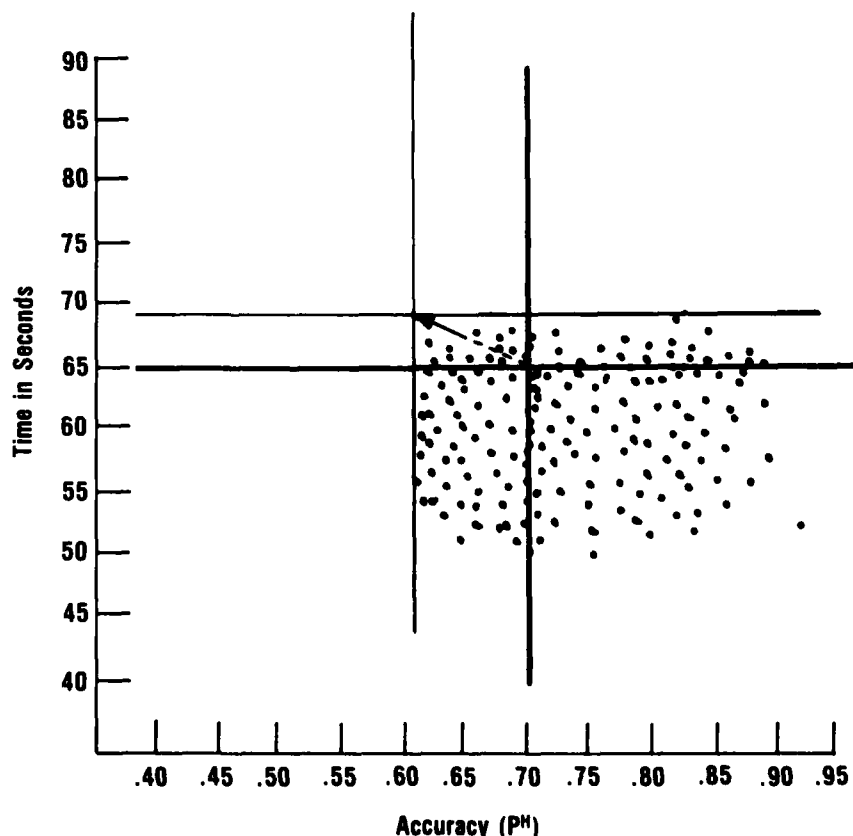
total system accuracy of .7 and an engagement time of not more than 65 seconds—as indicated by the heavy grid). Ideally, all data points would fall in the second quadrant (above minimum accuracy and below maximum time).[8] However, in order to achieve that ideal, the requirements must be reset (to the lesser accuracy of .6 and the greater time of 70 seconds—indicated by the lighter grid). The combat developer needs to reassess the source of the orginial requirements and determine whether the adjusted axes would provide militarily acceptable performance.

Changing the personnel-selection criteria: Analyzing the data in Figure 3 might show correlation between acceptable performance and one of the ASVAB scores (a reasonably likely condition, given the wide dispersion of weapon system performance data). Getting TRADOC and the Office of the Deputy Chief of Staff for Personnel (DCSPER) to agree to require a higher than planned minimum ASVAB score for gunners on the new system, the rough equivalent of a new or adjusted military occupational specially (MOS), would allow the original performance requirements to remain unchanged.

Changing the training program: Longer, more frequent and more costly training may provide a means of attaining the original performance goals with the same group of soldiers as those designated for the system being replaced. This alternative, however, is normally the most risky: The resources to support extra training are extremely scarce, and morale is hard to maintain when ordinary skills cannot be acquired and maintained without extensive, repetitive training.

In any case, being able to state these alternatives in quantifiable terms can provide a flexibility between the materiel and combat developers that should enable the latter to fine-tune their requirements as development proceeds. This would avoid what John E. Krings, defense director of operational testing, characterized as the result where the system "meets specifications perfectly, but won't work in a war."[9]

Conclusion

Continuous and Comprehensive Evaluation seems to offer a benefit to each of the major players in weapon system development. Testers can begin earlier and work longer; evaluators should have more control over the amount, kinds and form of data which are available for any given evaluation; program managers have new resources for quality assurance instead of bureaucratic antagonists; combat developers have the opportunity to adjust system performance specifications over development time without embarrassment; and Army decision-makers run fewer risks in supporting the continued development of expensive new systems.

Thus, C^{2}E has a potential for giving the Army a major boost in both field force effectiveness and Capitol Hill credibility. ■

References

1. Personal letter, General Thompson to AMC subordinate commands, Sept. 5, 1985.

2. DOD letter, Nov. 10, 1983.

3. Remark at OTEA, Nov. 29, 1984.

4. Remark at OTEA Nov. 29, 1984.

5. OMB Circular A-109 requires that a procuring government agency state system requirements with "mission performance criteria" that can be verified under "operational test conditions," p. 9.

6. Kaplan, Jonathan, "Continuous Evaluation: A Concept," *Journal of Operational Test and Evaluation*, Vol. VI, No. 4, Fall, 1985, pp. 20-23.

7. AMSAA staff, "Selected Examples of the Influence of Some Environmental/Battlefield/Man-Machine Factors on Weapon System Effectiveness (U)," technical report No. 384, July 1983.

8. Entirety of Figure 3 is a blow-up of a portion of the first quadrant of a major grid system.

9. Speech April 17, 1985, to the George Washington Chapter, International Test and Evaluation Association.

One never notices what has been done; one can only see what remains to be done...

—Marie Curie, physicist and chemist

This time, like all times, is a very good one if we but know what to do with it.

— Ralph Waldo Emerson

Malcolm R. Currie Heads New Corporation

Mr. Malcolm R. Currie, Hughes Aircraft Company executive vice president, has been elected president of the newly formed Delco Electronics Corporation. Dr. Currie, who will also continue in his current position with Hughes, was chairman of the Defense Systems Management College Policy and Guidance Council.

Currie is a 23-year veteran with Hughes and a former undersecretary of defense for research and engineering for the U.S. Department of Defense. ■

Whenever in this publication "man," "men," or their related pronouns appear, either as words or parts of words (other than with obvious reference to named male individuals), they have been used for literary purposes and are meant in their generic sense. ■

In Memoriam: Gregory B. Jarvis

A $50,000 scholarship fund has been established to honor the memory of Gregory B. Jarvis, an employe of GM's Hughes Aircraft Company subsidiary who died in the January explosion of the Challenger space shuttle. Mr. Jarvis, a civilian engineer at Hughes Space and Communications Group, was a payload specialist on the Challenger mission assigned to conduct 6 days of orbital experiments in fluid dynamics designed to improve methods of satellite construction.

"The nation has sustained a terrible loss through this tragic accident and General Motors mourns the loss of Mr. Jarvis, a valued employee," Roger B. Smith, GM president, said.

In a resolution, the GM Board of Directors said it was people like Mr. Jarvis who "brought Hughes Aircraft all its successes and made it the great national resource that it is." ■

DSMC Alumni Association Third Program Managers' Symposium June 18-19, 1986

Worldwide Membership Exceeds 700.

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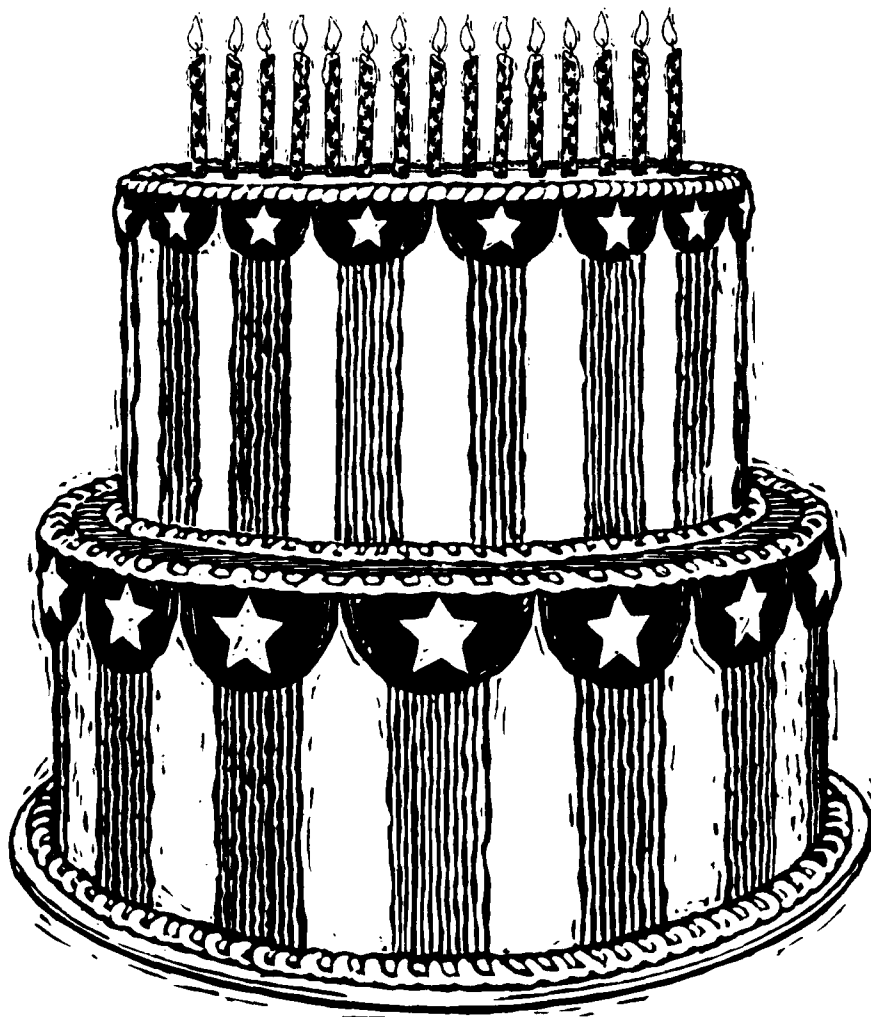Fort Belvoir, Virginia 22060-5426
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Happy Birthday, Sweet 15!

DSMC to Celebrate 15th Anniversary July 23

23,000 People have Studied at DSMC

The Defense Systems Management College (DSMC) will celebrate its 15th anniversary July 23 on the campus at Fort Belvoir, Va. Brigadier General Charles P. Cabell, Jr., USAF, commandant, invites alumni, former staff and faculty, and all friends of the college to take part in the festivities. Further plans will be announced in the May-June issue of *Program Manager*.

When the college observed its 10th anniversary in 1981, people attended from all over the country. Since the college opened in 1971, almost 23,000 military and civilian personnel from all of the armed services and other federal agencies, and managers from the defense industry have completed one or more courses at DSMC. By expanding its physical plant, DSMC is performing more educational and research missions on campus and at its four regional centers: St. Louis, Boston, Huntsville, and Los Angeles. Fore-

most, however, the college is dedicated to preparing program managers for U.S. defense systems, rather than staff or functional experts.

The college, which traces its genesis to July 1, 1971, has undergone a phenomenal growth from a "one-room" school to the present campus comprising seven buildings. This will be detailed in a special anniversary book of 400-plus pages covering the entire 15-year history of the college.

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